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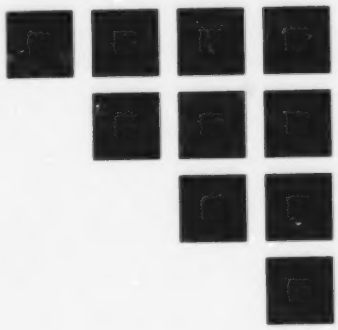


Earnings of University Graduates in Canada by Discipline

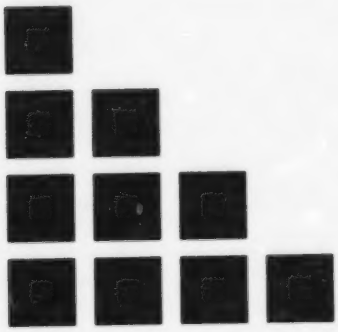
Fields of Plenty, Fields of Lean—A Cross-Cohort Longitudinal Analysis of Early Labour Market Outcomes

R-99-13E.a

by
Ross Finnie

August 1999

Research Paper



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Abstract

It is generally understood that early career – as well as longer-term – outcomes of university graduates vary significantly by field of study, but there is not a great deal of empirical evidence on the issue, especially in Canada, largely due to the lack of data suited to the task. The contribution of this paper is to report the results of an empirical analysis of the early career outcomes of recent bachelor's level graduates in Canada by discipline based on three waves of the National Graduates Surveys. These surveys comprise large, representative databases of individuals who successfully completed their programs at Canadian universities in 1982, 1986, and 1990. The information was gathered during interviews conducted two and five years after graduation for each group of graduates (1984/87, 1988/92, 1990/95).

The outcomes analysed, each one broken down by sex and discipline, include: the distribution of graduates by field and the percentage of female graduates; the percentage of graduates who subsequently completed another educational program; the overall evaluation of the choice of major (Would they choose it again?); unemployment rates; the percentage of workers in part-time jobs, in temporary jobs and self-employed; the job-education skill and credentials matches; earnings levels and rates of growth; and job satisfaction (earnings, overall).

Many of the outcomes conform to expectations, typically reflecting the different orientations of the various disciplines with respect to direct career preparedness, with the professions and other applied disciplines generally characterised by lower unemployment rates, closer skill and qualification matches, higher earnings, and so on. On the other hand, the "applied" fields tend to perform well in terms of the "softer," more subjective measures regarding job satisfaction and the overall evaluation of the chosen program. The findings also indicate that graduates' assessments of their post-graduation experiences and overall evaluations of the programs from which they graduated are based on more than simply adding up standard measures of labour market "success." The job satisfaction scores and – perhaps most interestingly – the overall program evaluations often depart from what the objective measures (unemployment rates, earnings levels, etc.) might have predicted.

This report is part of a set of research studies comprised of:

Earnings of University Graduates in Canada by Discipline:

- *Fields of Plenty, Fields of Lean–A Cross-Cohort Longitudinal Analysis of Early Labour Market Outcomes*
- *What You Study Matters–An Econometric Analysis of Earnings Differences of Bachelor's Level Graduates*

Résumé

En général, il est entendu que de l'évolution de la situation des diplômés universitaires dans les années qui suivent l'obtention de leur diplôme - ainsi qu'à long terme - varie de façon significative selon le domaine d'études, mais il y a peu d'évidences empiriques sur le sujet, surtout au Canada, en grande partie en raison du manque de données qui pourraient servir à cette fin. Le but de ce document est de rapporter les résultats d'une analyse empirique de l'évolution de la carrière des récents diplômés d'université canadienne par discipline basée sur trois *Enquêtes nationales auprès des diplômés* qui comprennent des bases de données d'envergure représentatives d'individus qui ont terminé avec succès un programme d'études universitaire canadien en 1982, 1986 et 1990. Les renseignements ont été recueillis dans le cadre d'entrevues effectuées deux et cinq ans après que chacun de ces groupes d'étudiants aient obtenu leur diplôme (1984/87, 1988/92, 1990/95).

Les résultats analysés, selon le sexe et la discipline, comprennent : la répartition des diplômés par domaine et le pourcentage des femmes, le pourcentage des diplômés qui ont terminé un autre programme d'études par la suite; l'évaluation globale du choix de la majeure (le diplômé choisirait-il encore la même majeure?); le taux de chômage; le pourcentage des travailleurs à temps partiel, temporaires, indépendants; la concordance emploi-étude; les niveaux de rémunération et les taux de croissance des revenus; et la satisfaction à l'égard de l'emploi (rémunération, globale).

Plusieurs résultats sont conformes aux attentes, c'est-à-dire qu'ils reflètent généralement les différentes orientations des diverses disciplines pour ce qui est de la préparation immédiate à la carrière; les professions et autres disciplines appliquées étant généralement caractérisées par des taux de chômage plus faibles, une meilleure concordance emploi-étude et un revenu plus élevé etc. D'un autre côté, les domaines « appliqués » obtiennent de bons résultats au niveau des mesures plus souples et plus subjectives concernant la satisfaction à l'égard de l'emploi et de l'évaluation globale du programme choisi. Les résultats indiquent aussi que les évaluations faites par les diplômés de leurs expériences post-universitaires et les évaluations globales de leurs programmes d'études sont basées sur plus que l'addition des mesures de « succès » normales sur le marché du travail. Les notes de satisfaction à l'égard de l'emploi et – peut-être encore ce qui est plus intéressant – les évaluations globales du programme diffèrent souvent des prévisions de mesures objectives (taux de chômage, niveaux de rémunération, *etc.*).

Ce document fait partie d'une série de deux études de recherche intitulées :

Earnings of University Graduates in Canada by Discipline:

- *Fields of Plenty, Fields of Lean–A Cross-Cohort Longitudinal Analysis of Early Labour Market Outcomes*
- *What You Study Matters–An Econometric Analysis of Earnings Differences of Bachelor's Level Graduates*

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1. Introduction

It is generally understood that early career – as well as longer-term – outcomes of university graduates vary significantly by field of study, but there is not a great deal of empirical evidence on the issue, especially in Canada. How do unemployment rates differ from one discipline to another and how do these evolve in the years following graduation? How many of the employed are in part-time or temporary positions? What are the patterns of self-employment? To what extent do graduates use the skills they have learned at school and how do their educational qualifications compare to the pre-requisites of the positions in which they are found? What is the level of job satisfaction? What are the differences in earnings levels and rates of earnings growth? How do graduates evaluate their programs of study? How do the patterns compare for men and women?[1]

This general dearth of evidence is especially surprising given the interest of such cross-field patterns to a range of readerships. Labour economists would find any such analysis of interest for what it tells us about the returns to different types of human capital and economic well-being at a critical career stage, especially in light of evidence that the major portion of real lifetime earnings growth occurs during the first few years of young people's post-schooling careers (Murphy and Welch [1990]). Policy makers would be interested in knowing the fields into which they should perhaps be encouraging young people to enter.[2] Universities and their representative bodies would be interested in knowing how graduates of different disciplines have been performing in order to perhaps adjust admissions strategies and help guide curriculum reform where the need was seen to be evident. Students would be interested in learning about outcomes by discipline so as to know what might be in store following graduation and to make more

[1] See Côté and Sweetman [1997] for a review of the Canadian and American literature on earnings patterns by discipline, the former including Dodge and Stager [1972], Finnie [1995], Mehmet [1977], and Vaillancourt [1995], the latter including (in various applications) Altonji [1993], Bishop [1991], Bound and Johnson [1992], Brown and Corcoran [1997], Eide [1994], Grogger and Eide [1994], and Loury [1997]. To this list could be added the work by this author – including joint work with others – cited below.

[2] This was one of the explicit motivations underlying the commissioning of the research reported in Finnie [1995]. In response to a recommendation by the National Advisory Board on Science and Technology, the Canada Scholarships in Science and Engineering program had been awarding a minimum of 2,500 scholarships of $2,000 or $2,500 per year to university students entering the relevant fields without really knowing how these students had been evaluating their educational experiences or doing in the labour market.

informed choices regarding field of study, while graduates might find it useful to compare their own experiences with the norm.

One of the principal reasons there is not a more extensive literature on comparative outcomes by field of study is that the established databases have not been particularly well-suited to the task. It is in such a context that this paper reports the results of an empirical analysis of the early career outcomes of recent Canadian Bachelor's level graduates based on three waves of the National Graduates Surveys, which comprise large, representative databases of individuals who successfully completed their programs at Canadian universities in 1982, 1986, and 1990, with information gathered during interviews conducted two and five years after graduation for each group of graduates (1984/87, 1988/92, 1990/95).[3]

The relatively under-utilised NGS databases are appropriate for the task of studying the patterns of outcomes by field of study for a number of reasons. First, they are large, representative, and include the necessary information on graduates' disciplines (as well as many other aspects of the educational program), thus facilitating the detailed analysis of differences in outcomes by field of study. Second, the longitudinal element of the National Graduates Surveys, deriving from the two interviews conducted for each cohort, allows the cross-field patterns to be analysed in a dynamic context for a reasonably extended period of time in the years following graduation (five years). Third, the availability of data for three separate cohorts of graduates facilitates the separation of the more enduring patterns from those which have been shifting over time, while covering a period thought to have been one of important labour market changes, especially for younger workers – with these shifts perhaps having affected the patterns of outcomes by field of

[3] This paper is one in a series on the school-to-work transition and early years in the labour market of Canadian post-secondary graduates by the author: Finnie [1999a] documents the employment and earnings patterns of college and university graduates at all levels (Bachelor's, Master's, Ph.D.), Finnie [1999b] analyses the changes in the structure of graduates' earnings using standard decomposition techniques based on regression models, Finnie [1999c] focuses on the dynamic aspects of the school-to-work transition of graduates, and Finnie [1999d] investigates the earnings patterns of Bachelor's level graduates by discipline using econometric modelling techniques. Joint work includes Betts, Ferrall, and Finnie [1998, 1999], with the first paper using a hazard model framework to look at the time to the first job, and the latter analysing the effects of school quality on graduates' earnings; a series of papers with Marie Lavoie (Finnie and Lavoie [1997]), Lavoie and Finnie [1998a, 1998b, 1998c, 1999] which focuses on engineering and other science and technology graduates in the context of the accumulation of technology; Finnie and Wannell [1999] and Abbott, Finnie and Wannell [1999], which explore the gender aspects of graduates' outcomes; and Burbidge and Finnie [1999], which investigates the inter-provincial mobility of post-secondary graduates.

study.[4] Finally, the variables available in the NGS databases include a mix of conventional measures, such as employment status and earnings levels, and others which are of a somewhat more subjective nature and/or more explicitly focused on the school-to-work transition and the relation of early labour market outcomes to graduates' educational experiences, such as the job-education skill match, the level of job satisfaction, and the overall evaluation of the educational program.

In short, the size and representative structure of the NGS databases, their panel nature, the availability of three cohorts of data, and the interesting variables available provide the opportunity for an interesting multi-faceted study of the differences in early labour market outcomes amongst Bachelor's level university graduates by field of study in Canada in the 1980s and 1990s. The specific elements of the analysis, all broken down by sex and field of study, are as follows:

- the distribution of graduates by field of study;
- the percentage of male versus female graduates;
- the percentage of graduates who subsequently completed another educational program;
- the overall evaluation of the choice of field of study (would they choose it again?);
- unemployment rates;
- the percentage of workers in part-time jobs, in temporary jobs, self-employed;
- the job-education skill match and graduates' educational qualifications versus the requirements of their positions;
- job satisfaction (earnings, overall);
- earnings levels and rates of growth.

The paper is laid out as follows. The next section describes the National Graduates Surveys databases, the construction of the working samples, the analytical framework, and the specific variables included in the analysis (see also Appendix B for the latter). This is followed by the presentation of the empirical results, which makes up the bulk of the paper. The final section includes a summary of the major findings, some broad implications, and suggestions for further research.

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[4] Beaudry and Green [1997], Beach and Slotsve [1996], Finnie [1997a], Morissette and Bérubé [1996], Morissette, Myles, and Picot [1995], Picot [1997], Riddell [1995], and Zyblock [1996] all report that the earnings levels of younger workers have been declining in relative and/or absolute terms; while Beaudry and Green, Morissette and Bérubé, and a series of papers by Finnie [1997b, c, d] indicate that younger workers' movements up the earnings ladder over the early years in the labour market have also slowed.

2. The Data and the Analytical Framework

In the first part of this section, the general characteristics of the National Graduates Surveys are described and the selection of the working samples is documented. In the second part, the analytical framework is explained. The final part includes a run-down of the variables used in the analysis.

2.1 The NGS Data and the Construction of the Working Samples

The National Graduates Surveys

The National Graduates Surveys (and follow-up) databases, developed by Statistics Canada in partnership with Human Resources Development Canada, are well suited to this analysis for a number of reasons. First, the NGS files are representative of the underlying national population of college and university graduates in the given years, and include large numbers of observations – more than 30,000 individuals in each survey.[5] Furthermore, the NGS databases are based on a stratified sampling scheme, with stratifications by discipline as well as province and level of education. The abundant overall sample size and the underlying weighting scheme thus facilitate the meaningful analysis of outcomes by field of study.[6]

Second, the NGS databases have a longitudinal aspect, stemming from the two interviews carried out for each cohort, two and five years after graduation. This allows for a dynamic analysis of the school-to-work transition, with the associated view precisely situated as of the two specific points in time relative to graduation corresponding to the interview dates, while covering a relatively extended period of time – the first five years after leaving school.

Third, data are available for three separate cohorts of graduates – representing those who successfully completed their Bachelor's programs in 1982, 1986, and 1990 – thus permitting the comparison of outcomes over a period generally thought to have been characterised by important

[5] The databases include college and university graduates at the Master's and Doctoral levels, but these individuals are not included in the present analysis, which is focused on Bachelor's level graduates.

[6] The sample framework of the NGS databases is established through the use of institutions' administration files on graduates, with those records also providing some of the basic educational information on the NGS files, such as program and discipline of study.

changes in labour market outcomes, especially for younger workers, while also bringing the record as up to date as possible.[7]

Finally, the NGS databases include an interesting array of variables covering the educational experiences, general labour market outcomes, and specific job characteristics of graduates. These include not only more conventional measures, such as employment status and earnings levels, but also others which are more specifically related to the particular experiences of recent post-secondary graduates and the school-to-work transition, such as the extent to which the skills learned at school were being used in the job and evaluations of both the current job and the education program from which the individual graduated.

In summary, the three NGS databases uniquely provide for a focused, detailed, and dynamic analysis of early labour market outcomes by field of study amongst Canadian post-secondary graduates in the critical early years following graduation from the early 1980s into the mid-1990s. The NGS data are interesting and unique not only in a Canadian context, but to the best of this author's understanding, unequalled in the world in terms of offering large representative surveys of post-secondary graduates covering various elements of the school-to-work transition over the last decade and a half.

Selection of the Working Samples of Bachelor's Level Graduates

First, the entire analysis excludes graduates who had already accumulated five or more years of full-time work experience by the time of graduation from the program in question or who were 35 years of age or older upon completing their studies. This selection was made on the grounds that such individuals are different from "fresh" graduates in ways that should be taken into account in any analysis. These graduates are certainly an interesting group, but one which is best left to a separate study.

Second, after looking at the distribution of graduates and their overall evaluations of their programs of study, those who obtained an additional degree by one of the two interviews were

[7] The first survey of 1995 graduates has been carried out, but those data were not ready for analysis at the time of writing and will obviously lack the second interview data until those are collected in the year 2000.

deleted from the analysis at that point.[8] This was done, first of all, because such graduates no longer belonged to the original education group (*e.g.*, a Bachelor's graduate might have become a Master's graduate and perhaps changed disciplines) and had in any event been mixing school and work in a way likely to affect the labour market outcomes upon which this analysis is focused. A second reason for this selection rule is that including "additional degree graduates" would also have thrown off the precise post-graduation time frame corresponding to the two interview dates (*i.e.*, two and five years after graduation) which holds for the non-continuing group. Furthermore, and of particular relevance to this paper, it is impossible to identify the specific field of study – obviously a critical piece of information – in which any new degree was obtained as of the 1984 survey for the 1982 graduates.

Third, for all the labour market outcomes analysed below, part-time workers who cited school as the reason for their only partial involvement in the labour market were also deleted on the grounds that such individuals were – by definition – still principally students and had therefore not yet entered the school-to-work transition phase of their careers in earnest.[9] Other part-time workers were, on the other hand, generally included in the analysis, lending it a broad labour market base.

To further focus the analysis on individuals with the most significant labour market attachment and to thereby abstract from labour supply decisions which could affect earnings and other outcomes, separate sets of calculations for most of the outcomes presented below were also

[8] That is, graduates who had obtained a new degree/certificate/diploma by the first interview were deleted from both periods' analysis, while those who obtained a new diploma only by the second interview were included in the first period calculations (as long as they met the other selection criteria) but not the second. This selection procedure results in samples which are as inclusive as possible for each survey year, which is especially important in a context where going on to further schooling could be related to early labour market outcomes, a hypothesis which finds support in the case of engineering graduates in Finnie and Lavoie [1997]. Essentially all formal post-secondary degree/certificate/diploma programs were considered in this selection. Exceptions include the following: "interest"/recreation-type courses, which typically do not represent any sort of formal human capital investment and which should not generally have a direct effect on early labour market outcomes; banking and insurance certificates, which are normally gained largely as a matter of a course by those on certain career paths; non-professional health certificates which, by their very designation, are not generally career related; high school diplomas, which are deemed to largely represent an accreditation formality without direct effects on labour market outcomes for those already possessing post-secondary diplomas; and registered apprenticeships, which are again seen to be part of a normal career path rather than additional formal schooling *per se*.

[9] An analysis of the 1982 cohort, for which enrolment status as of the interview dates is given in the NGS files (which was not the case for the later cohorts), revealed that most individuals eliminated by this restriction (part-time – student) were in fact full-time students and, conversely, that most full-time students were eliminated by this condition, precisely as wished.

carried out with the samples restricted to full-time workers. These results (available upon request from the author) were generally very similar to the main findings (where part-time workers are included) presented below, lending an additional generalisability to the findings. (Some of the key earnings results are presented for both all workers, and full-time workers only.)

Fourth, "other" workers (*i.e.*, not paid, not self-employed) were eliminated from most of the labour market analysis. Employment status, earnings levels, and other job outcomes of such family workers, volunteers, and other non-standard workers would be expected to depart from those of others (as verified empirically), and therefore these small numbers of individuals (under one-half of one percent in each survey) were deleted. A similarly small number of workers deemed to have unreasonably low earnings were also excluded from the samples.[10]

Finally, observations were dropped if the required information was missing on a variable-by-variable basis, affecting a very small number of observations.

2.2 The Analytical Framework

The methodology used in this analysis is quite straightforward. One broad set of outcomes represents the percentage distribution of graduates who had engaged in certain activities (*e.g.*, those who went on to obtain another diploma), who had a particular status (*e.g.*, unemployed or employed part-time), or who were characterised in some other specific way (*e.g.*, a temporary job, self-employment). A second set of results represents the mean values of various outcome measures, such as earnings levels or the evaluation of the job held or the educational program from which the individual graduated. Findings are generally presented for all graduates in the working samples taken together, by sex, and by field for men and women.

Reported statistics are based on a minimum of 30 observations. This rule takes two forms. First, mean outcomes such as earnings levels and the job-education skill match index are reported in cases where the calculations are based on cells (*i.e.*. the men or women of a given discipline

[10] Full-time workers with less than $5,000 in annual earnings (the equivalent of a wage of about $3.20 per hour for 30 hours of work per week over 52 weeks) were deleted. This affected no more than approximately one-half of 1 percent of the sample in each year, with a relatively high proportion of the first interview cases (where there were generally more such low earners) being individuals who then obtained a new diploma by the subsequent interview (who were otherwise eliminated from most of the analysis – see above), suggesting the relevant jobs were research assistantships or other such atypical jobs.

included in the relevant samples) having at least 30 observations – a very straightforward and relatively conventional rule.

Second, the percentage of graduates characterised by given categorical outcomes, such as unemployment rates or the percentage of individuals who worked part-time, had temporary jobs, or were self-employed, are reported where i) there are at least 30 observations per parameter for the relevant group, with the number of parameters taken to be the number of cells minus 1 (effectively the number of independent parameters), or ii) there are at least 30 observations in a particular cell (where a cell is defined here as the men or women of a given discipline having the relevant status, such as being a part-time or full-time worker or being unemployed). Smaller cells for which the information is suppressed are indicated by a dash. (Zeros are shown as such.)[11]

For all the mean outcomes – earnings, job evaluation scores, and so on – the conventionally estimated standard errors of the means are also reported. The last part of Appendix A contains a discussion of these estimates in the case of the index measures used in the analysis, introduced below (*i.e.*, the overall evaluation of the educational program, the job-education skill match, job satisfaction).

2.3 The Field of Study Classification and the Variables Included in the Analysis

Field of Study Classifications

The field of study classifications employed in the analysis are as follows (see Appendix A for more detailed field listings):

[11] The logic behind the "rule of 30" applied to the categorical outcomes is as follows. In the simplest case where there are just two possible outcomes (e.g., the percentage of individuals with temporary versus permanent jobs), the proportions in the two cells comprise just one independent parameter. Applying the rule of 30 thus means that (2-1) x 30=30 observations are required to report the result for that one independent parameter – even as two numbers are given in the table, these summing to 100 percent. Extending the case by one additional possible outcome implies two independent parameters, with the rule of 30 requiring that there be at least (3-1) x 30=60 observations to report the three proportions (which again sum to 100 percent). In short, the general rule of 30 is simply applied to the number of independent parameters to be estimated across any distribution. Finally, where there are at least 30 observations in a given cell, that proportion is reported even if the entire set of percentages do not meet the more general reporting rule on the grounds that the statistic singly conforms to the rule of 30. The choice of 30 as the cut-off conforms to common practice based on the behaviour of parameter estimates across different sample sizes. On the other hand, this set of reporting rules is essentially arbitrary and an alternative approach would have been to report standard errors (or, less interestingly, the coefficient of variation) in every case. The rule of 30 used here is, however, convenient and has a reasonably solid statistical foundation.

- No Specialization
- Elementary/Secondary Teacher
- Other Education
- Fine Arts and Humanities
- Commerce
- Economics
- Law
- Agricultural and Biological Sciences
- Veterinary Sciences
- Engineering
- Medical Professions (*i.e.*, doctors, dentists, *etc.*)
- Other Health
- Computer Science
- Mathematics and Other Physical Sciences
- (Other) Social Sciences

This classification scheme resulted from the desire to keep the number of fields as small as possible (for the sake of a focused analysis), while allowing for important cross-discipline differences in the outcomes being analysed. The decision process began by using the standard USIS field groupings employed in the NGS data as a starting point, and then conducting a preliminary analysis of cross-field earnings patterns (a key outcome) at a more detailed level across the different survey years (by sex). The indicated groupings of fields are thus characterised by being of at least a generally similar nature and by having reasonably consistent earnings patterns.

Some of the field categories are rather broad and include relatively large numbers of graduates (as will be seen below), such as the general Other Social Sciences group; whereas others are quite narrow and include relatively few graduates, especially for one or the other sex, such as male Other Health graduates and female Computer Science graduates. These were, to repeat, the result of attempting to keep like graduates together and different ones apart – where "like" and "different" are defined in terms of the nature of the disciplines as well as the associated outcomes

(earnings). Thus, it turned out that most Social Science graduates could be fairly grouped together, but that economics graduates had to separated out, and so on.

The Variables Used in the Analysis

The following variables are employed in the analysis, with more detailed documentation of each measure provided in Appendix B:

Overall evaluation of the education program: Based on the question: "Given your experience, would you have taken the same field of study or specialization?" The tables report the mean scores of an index constructed from the responses to this question, with higher values indicating greater satisfaction with the choice and essentially representing the percentage of graduates who said they would have chosen the same program again. The measure could not be constructed from the 1984 data, but should otherwise be quite comparable across all periods.

New diploma: The (cumulative) percentage of graduates who obtained one or more additional diplomas (at higher or lower levels) between graduation in the base year (1982, 1986 or 1990) and the interview dates.

Labour force status (unemployed): Essentially a standard measure, although there is one small departure which results in a slight upward bias (*i.e.*, full-time students are considered as unemployed if they meet the usual conditions of being without a job and looking for work, which is not usually the case).

Part-time employment: Less than thirty hours per week (standard definition).

Temporary job: Based on a direct question to this effect which is almost perfectly consistent across surveys. The 1987 data overstate the number of temporary workers to a small degree, however, since individuals who had worked continually with the same employer since the first interview (1984) were assumed to have been in a permanent job.

Self-employment: Based on a direct question. As noted above, "other" workers (non-wage/salary workers, not self-employed) are deleted from most of the analysis (*i.e.*, job outcomes).

The job-education skill match: Represents the mean scores of a discrete index running between 0 and 100 created by the author from the categorical information available in the raw NGS data derived from the question "Do you use any of the skills acquired through the education program in your job?" with higher values indicating closer job-education skill matches. More specifically, for the 1982 and 1986 cohorts, the available responses of "no" and "yes" were assigned index values of 0 and 100 respectively, while for the 1990 cohort, values of 0 ("not at all"), 33 1/3 ("very little"), 66 2/3 ("to some extent"), or 100 ("to a great extent") were assigned. The measure is, therefore, consistent for the two interviews of each cohort, but not necessarily across the two earlier cohorts and the last cohort. (This measure departs from one which is similarly named in the raw NGS datafiles.)

Educational pre-requisites of the current job: Represents the level of education required for the job as compared to the diploma obtained at graduation, based on comparing the responses to the question: "When you were hired...what were the minimum educational qualifications required?" to the degree received in 1982, 1986, or 1990. The response options varied across the survey years, but were converted to the broader categories (below College, College, Bachelor's, Master's, and Ph.D.) which correspond to the degree level information available for the 1982 cohort in order to have the most consistent measure possible across surveys. (This measure also departs from one which is similarly named in the raw NGS datafiles.)

Job satisfaction – earnings, overall: Based on the questions: "Considering the duties and responsibilities of your job, how satisfied are you with the money you make?" and "Considering all aspects of your job, how satisfied are you with it?" The tables report the mean scores of indices constructed from the responses to this question, with higher values indicating greater job satisfaction. The measures should be directly comparable across all survey years, since the response options were relatively similar: "very satisfied" (a score of 1), "satisfied" (.67), "dissatisfied" (.33), "very dissatisfied (0)" in the 1986 and 1990 survey years (1988/91 and 1992/95); and the last two options differing only very slightly for the first cohort: "not satisfied", "not at all satisfied"

Earnings: Based on the question: "Working your usual number of hours, approximately what would be your annual earnings before taxes and deductions at that job?" thus representing the

rate of pay as measured on an annual basis, rather than the amount necessarily earned. All values are expressed in constant 1995 dollars, rounded to the nearest thousand, and capped at the $99,000 upper limit which characterises the 1984 data (the lowest bound in the six databases), or $143,035 in constant 1995 dollars.

3. The Empirical Findings

The discussion of the findings is focused on the following themes:

- The cross-discipline patterns which hold most generally – for both men and women and across all surveys.
- The evolution of the patterns over the early years in the labour market – from two to five years following graduation.
- The patterns by sex.
- Comparisons of the patterns across cohorts – looking for any shifts from the first through third cohorts.

3.1 The Distribution of Graduates by Field of Study and Sex

The distribution of graduates by field of study is shown in Table 1, while the share of female graduates within each discipline is shown in Table 2. Interestingly, the distributions by field were relatively stable across cohorts, with the only significant shifts being a moderate decline in the percentage of engineering graduates amongst men; and declines in elementary and secondary teaching and fine arts and humanities graduates amongst women, offset by increases in the percentage of commerce graduates and general social sciences.

The extent of this stability in the distribution of graduates by field is perhaps somewhat surprising, leading to a number of related questions. Was this stability primarily due to demand side or supply side factors – that is, students' preferences or the spots available at universities? Is the "production" of graduates in different fields as flexible and responsive as it should be as employment opportunities (and employers' needs) ebb back and forth over time? Should the general lack of any secular shifts in the distribution of graduates by field of study be cause for worry as the economy moves in directions which should presumably favour certain types of graduates over others? As a concrete example, the share of computer science graduates did not increase in any dramatic fashion across cohorts (3 percent of male graduates in 1982 and 4 percent in 1990, and 2 and 3 percent of female graduates in the same years), despite what would seem to be a clear need for greater numbers of such graduates.

Table 1: The Distribution of Graduates by Field of Study

	1982 Cohort %	1986 Cohort %	1990 Cohort %
Males			
No Specialization	2	4	3
Elem./Secon. Teaching	4	5	5
Other Education	5	4	5
Fine Arts & Humanities	10	11	12
Commerce	15	15	15
Economics	6	5	6
Law	5	3	4
Other Social Sciences	13	11	14
Agric. & Bio. Sc.	6	6	6
Veterinary	1	1	1
Engineering	19	17	15
Medical Professions	4	3	3
Other Health	2	1	2
Computer Science	3	5	4
Math. & Other Phys. Sc.	6	7	6
	100	100	100
Females			
No Specialization	2	3	3
Elem./Secon. Teaching	16	12	12
Other Education	9	6	7
Fine Arts & Humanities	17	18	17
Commerce	9	11	12
Economics	2	2	2
Law	4	3	3
Other Social Sciences	18	21	22
Agric. & Bio. Sc.	6	6	7
Veterinary	1	1	1
Engineering	2	2	2
Medical Professions	2	2	2
Other Health	8	8	7
Computer Science	1	2	1
Math. & Other Phys. Sc.	2	3	3
	100	100	100

Note: In this and all following tables, the samples exclude those who were older than 35 or who had more than five years of full-time experience by the date of graduation.

The overall share of female graduates rose over time, from 50 percent in the first cohort, to 52 percent in the second, to 54 percent in the third – women thus coming to represent a clear majority of Bachelor's level graduates. There have, however, been tremendous differences in the gender patterns by discipline. Female graduates having been significantly over-represented in teaching/education, fine arts/humanities, the general social sciences, and other health disciplines (*i.e.*, apart from doctors, dentists, pharmacists, optometrists, and the like – dominated by nursing

graduates). Women have, on the other hand, been under-represented in economics, engineering, computer science, and mathematics and the physical sciences. The other fields have had more or less similar numbers of male and female graduates (agricultural and biological sciences, veterinary sciences, medical professions), or have seen women catch up to men over time (commerce, law).

Table 2: The Percentage of Female Graduates by Field of Study

	1982 Cohort %	1986 Cohort %	1990 Cohort %
All	**50**	**52**	**54**
No Specialization	49	51	50
Elem./Secon. Teaching	79	73	72
Other Education	66	64	65
Fine Arts & Humanities	63	63	61
Commerce	38	44	47
Economics	21	33	28
Law	43	46	52
Other Social Sciences	57	67	64
Agric. & Bio. Sc.	51	52	58
Veterinary	47	42	56
Engineering	11	13	15
Medical Professions	35	39	43
Other Health	83	86	82
Computer Science	24	31	20
Math. & Other Phys. Sc.	30	30	36

The relative stability of these patterns is perhaps surprising – although the data cover graduates who finished their studies just eight years apart (1982 through 1986 to 1990), and we should perhaps not expect particularly dramatic changes over such an interval. Nevertheless, the sort of points raised regarding the relative stasis in the distribution of graduates by field of study could again be noted in the context of these gender patterns, especially as there has been relatively slow entry of women – or even declines – in some disciplines typically perceived as needing to attract greater numbers of students which have traditionally been male dominated, such as engineering, computing, and the pure sciences. In short, why are women still staying away from these disciplines, what are the consequences of this penury, and what should and can be done about it? These male-female differences are also important in an analytical sense, as they typically play an important role in the overall differences in outcomes by gender seen below.

3.2 Overall Evaluation of the Educational Program

The findings regarding the overall evaluation of the educational program are given in Table 3. These figures – the mean scores of the underlying index which has been constructed from the responses to a question regarding the choice of field (see above and Appendix B) – can be interpreted as representing the percentage of graduates who said that, given the chance, they would have chosen the same field of study again.[12]

Overall, the results indicate that approximately three-quarters (or just under) of all Bachelor's graduates were satisfied with their choices, with female graduates' scores running slightly lower than males' scores in all years. While the clear majority of graduates were happy with their choice of discipline, the fact that approximately one-quarter of them were not similarly content should perhaps be cause for question, concern, and further investigation as to why this might be and what could be done to improve matters – this being such an important decision in an individual's career and life generally, and for the nation's economic performance.

The generally high satisfaction fields include the professional programs – teaching, commerce (although less so for the most recent cohort of female graduates), law (again excepting the 1990 female graduates), engineering, medical professions, other health – as well as computer science. The next tier of disciplines with medium or more mixed levels of satisfaction includes other education, fine arts and humanities, veterinary sciences, and mathematics and physical sciences, the latter verging on the low side. The lowest levels of satisfaction have been amongst graduates with degrees in economics, the other social sciences, and agricultural and biological sciences.

Although the highest approval ratings went to the fields which might be thought of as being the most directly connected to labour market skill sets and career paths (the professionals and computer scientists), the fine arts and humanities graduates, who are presumably the polar opposite in this respect, scored in the middle rank, placing them almost uniformly ahead of social science graduates, as well as those in the theoretical and applied sciences. Satisfaction with the

[12] In Finnie [1999c], a broader measure which includes the evaluation of the level of the program – as well as the specific field of study – is presented. The results shown there imply, however, that most Bachelor's level graduates were quite happy with the choice of level, and that most of their dissatisfaction was related to the specific field of study – the theme upon which this paper is focused.

educational program is clearly – at least for some groups of graduates – more than a matter of job market preparation.

Table 3: Index of the Overall Evaluation of the Educational Program (Field)

	1982 Cohort	1986 Cohort		1990 Cohort	
	1987	1988	1991	1992	1995
	%	%	%	%	%
All	**73**	**77**	**76**	**73**	**70**
Males					
All	**74**	**78**	**78**	**75**	**71**
No Specialization	69 c	71 b	69 c	68 c	65 c
Elem./Secon. Teaching	65 c	84 b	84 b	81 b	76 c
Other Education	67 c	68 c	73 c	75 c	69 c
Fine Arts & Humanities	73 b	78 b	77 b	72 b	74 b
Commerce	79 a	81 a	80 a	79 a	76 b
Economics	67 c	70 c	66 c	59 c	64 c
Law	86 c	89 b	90 b	88 c	77 c
Other Social Sciences	67 b	65 b	61 b	60 b	56 b
Agric. & Bio. Sc.	69 b	68 b	72 b	70 b	69 b
Veterinary	77 c	87 c	88 c	77 c	70 c
Engineering	75 a	83 a	83 a	83 a	79 a
Medical Professions	90 b	90 b	97 a	96 a	92 b
Other Health	87 c	90 c	87 c	84 c	79 c
Computer Science	83 b	90 a	86 b	88 b	90 b
Math. & Other Phys. Sc.	70 b	68 b	69 b	67 b	66 b
Females					
All	**72**	**76**	**74**	**71**	**68**
No Specialization	63 c	69 c	71 c	68 c	66 c
Elem./Secon. Teaching	75 a	82 a	79 a	84 a	76 a
Other Education	66 c	74 b	70 b	73 b	65 c
Fine Arts & Humanities	70 b	76 a	75 a	68 a	64 b
Commerce	77 b	81 a	78 b	71 b	69 b
Economics	55 c	64 c	62 c	41 c	34 c
Law	79 c	81 c	83 c	71 c	63 c
Other Social Sciences	62 b	67 a	65 a	59 a	60 a
Agric. & Bio. Sc.	68 b	70 b	66 b	61 b	63 b
Veterinary	73 c	76 c	75 c	75 c	71 c
Engineering	71 c	76 c	77 c	82 c	77 c
Medical Professions	94 b	91 b	91 b	94 b	90 b
Other Health	79 b	82 a	81 b	83 a	79 b
Computer Science	82 c	86 c	90 b	84 c	87 c
Math. & Other Phys. Sc.	70 c	72 c	69 c	69 c	71 c

Note: The means with no letter subscript have standard errors below 1, those with an *a* have standard errors between 1 and 2, those with a *b* have standard errors between 2 and 3, and those with a *c* have standard errors greater than 3.

One particularly noteworthy group is female economics graduates, who had the lowest scores in all periods, with astoundingly low approval ratings of just 41 and 33 percent as of the two interview dates for the last cohort in particular – that is, as many as two-thirds of these graduates said that, given the chance, they would have chosen another field of study. The economics

discipline is presumably given reason to consider the meaning of these results, their underlying causes, and what might be done to improve matters (even as it should be emphasized that male economics graduates have generally expressed levels of satisfaction similar to those in the other social sciences) – especially since enrolments in economics have typically been falling of late (thus at the same time validating the meaning of these numbers).

The relatively low levels of satisfaction amongst graduates in mathematics and the physical sciences, as well as those with degrees in the agricultural and biological sciences, might be cause for concern at a broader social level, since science and technology are so critical to the wealth of nations in the new "knowledge based economy," a theme which is focused on in Lavoie and Finnie [1999].

There are no clear trends in the scores from the first interview to the second for each of the given cohorts, perhaps implying that (in particular) graduates have not generally been (un)pleasantly surprised by the evolution of their post-graduation outcomes – at least as they relate to their chosen fields of studies – even as job outcomes changed to a considerable degree over this interval (see below). This is an interesting and potentially important finding regarding the "rational" and informed nature of individuals' choices of discipline and the relation of these choices to labour market outcomes, a topic the author plans to pursue further in future research.

Neither were there any general shifts in the scores across cohorts, with these relatively stable satisfaction levels contrasting with what would seem to be the popularly held belief that times have been generally hard for the young people of "Generation X", resulting in a deep and multi-faceted malaise amongst the graduates represented in these data, especially the later cohorts. While the question is obviously a subjective one, it is quite clearly worded and any general increases in the dissatisfaction of this generation would presumably have been expected to show up to at least some degree in such a basic question as this.[13]

3.3 Further Studies

Table 4 shows the percentage of graduates who obtained a new diploma – at any level (see below) – between graduation in the survey base years (1982, 1986, 1990) and the first or second

[13] An alternative interpretation is the decidedly more cynical one that young people have become so discouraged and believe that the underlying problems are so widespread that simply choosing another field would make little difference.

interview. Overall, 15 to 19 percent of all Bachelor's level graduates had obtained another diploma as of two years following graduation, and from 22 to 36 percent by five years later. Interestingly, male and female graduates continued with their studies at very similar rates. Recall that such individuals are deleted from the remainder of the analysis, for the reasons given above.

The percentage of Bachelor's level graduates who obtained an additional diploma was lower for the second cohort – especially as of the second interview. This might suggest the existence of two broad types of Bachelor's graduates who continue with their studies: those who go straight through after finishing their undergraduate degrees and who might be committed to this path more-or-less regardless of the prevailing labour market conditions, and those who make initial forays into the labour market and subsequently return to school if they find their employment opportunities to be relatively limited.[14]

Interestingly, just 30 to 40 percent of the new diplomas were at a higher level (Master's, Ph.D.), approximately one-half were again at the Bachelor's (or first professional degree) level, and the remaining 10-20 percent were at the College level (figures reported in Finnie [1999c]). There are, however, many reasons for the relatively high rates of "non-progression" from one Bachelor's level degree to another: some individuals begin with a certificate program and then continue on to the formal Bachelor's degree once this is completed, others do an additional year or so beyond their original degree in order to pick up a different field of concentration, and first professional degrees are included at the Bachelor's level (consistent with their treatment in the NGS data). These patterns are, therefore, perhaps not so surprising.

With the precise mix of graduates at the College, Bachelor's, Master's, and Doctoral levels—in terms of both their numbers and their quality—now generally recognised as an important element of the "knowledge based economy," the patterns by field are interesting and important. Focusing on the second interview cumulative totals, the broad patterns for male and female

[14] That is, the sluggish economic conditions faced in the early post-graduation years by the 1982 and 1990 cohorts (1983 and 1984 were recession years, while the early 1990s were marked by another recession followed by a rather lukewarm labour market recovery – see Finnie [1999a]) may have resulted in a higher proportion of these graduates pursuing further studies, while the stronger labour market faced by the 1986 cohort in their early post-graduation years (1987 and 1988 were years of strong economic growth) may have diminished this tendency. This idea was originally developed in the context of an analysis of engineering graduates in joint work with Marie Lavoie (Finnie and Lavoie [1997]).

graduates across the three cohorts show that the percentage of graduates who continued with their studies tended to be high in fine arts and humanities, general social sciences, agricultural and biological sciences, and mathematics and physical sciences. More average or mixed rates are seen in teaching/education, economics, law, and veterinary sciences. The lowest rates are for commerce, engineering, and computer science, as well as medical professions and other health graduates.

Table 4: Percentage of Graduates Who Completed a New Diploma by the Relevant Interview

	1982 Cohort		1986 Cohort		1990 Cohort	
	1984	1987	1988	1991	1992	199
	%	%	%	%	%	%
All	**19**	**36**	**15**	**22**	**16**	**36**
Males						
All	**17**	**36**	**13**	**20**	**16**	**35**
No Specialization	42	62	11	19	19	48
Elem./Secon. Teaching	12	29	6	22	12	21
Other Education	28	42	25	30	19	40
Fine Arts & Humanities	25	42	18	29	24	45
Commerce	13	31	13	18	16	30
Economics	25	44	15	20	23	34
Law	24	27	18	23	21	40
Other Social Sciences	21	44	17	26	13	37
Agric. & Bio. Sc.	14	43	13	20	18	52
Veterinary	11	32	11	21	8	40
Engineering	10	30	10	16	9	26
Medical Professions	18	31	9	16	16	33
Other Health	10	28	7	14	8	21
Computer Science	6	18	4	5	6	19
Math. & Other Phys. Sc.	18	37	16	24	20	48
Females						
All	**21**	**35**	**17**	**24**	**17**	**36**
No Specialization	32	30	12	22	26	52
Elem./Secon. Teaching	16	26	16	25	8	20
Other Education	35	47	23	32	15	31
Fine Arts & Humanities	26	40	26	30	24	47
Commerce	11	29	11	15	9	22
Economics	12	28	10	20	17	42
Law	32	39	19	26	29	43
Other Social Sciences	24	42	17	26	20	45
Agric. & Bio. Sc.	14	41	18	25	22	52
Veterinary	14	22	7	9	10	33
Engineering	16	33	11	16	7	27
Medical Professions	7	18	5	15	11	21
Other Health	12	23	10	18	8	20
Computer Science	10	12	10	16	7	11
Math. & Other Phys. Sc.	15	27	18	26	23	41

Some of the higher rates presumably reflect natural career progressions – that is, in areas such as the social and natural sciences, the Bachelor's degree essentially provides an introduction to the discipline, while those who wish to work in these areas generally require an advanced degree. In other cases, such as fine arts and humanities, the higher rates probably often reflect switches from one discipline to another, including going on to professional school; after having studied what they liked (and perhaps proved their talents along the way), many of these graduates change to a degree where they are more likely to be able to find a job and build an interesting and productive career.

At the other end of the spectrum, the relatively low rates of further studies in the case of engineering and (especially) computer science graduates might be cause for concern, even as these patterns presumably stem at least partly from the good job opportunities faced by such graduates. Are we, in particular, producing sufficient numbers of such graduates at a time when science, technology, and computers are at the fore?[15]

Obviously, many questions regarding the pursuit of further degrees remain – indeed, including those raised above. What are the precise levels and types of the additional degrees obtained by the graduates of each field? What are the characteristics of those who go on as compared to those who do not? What are the factors involved in these decisions? What are the personal benefits associated with further studies? What are the implications for the economy as a whole? What policy measures which could help ensure the optimal number and type of graduates? Answering these and other related questions lies, however, beyond the scope of this paper and such investigations are left to a future project which might build on the results presented here and further exploit the NGS data in these directions.

3.4 Employment Rates and Job Status

Unemployment Rates

Table 5 shows the unemployment rates of the graduates in the working samples (see section 2.1 above and the notes to the table for the selection criteria for these and all subsequent calculations). Unemployment rates for all graduates taken together were generally quite low,

[15] See Lavoie and Finnie [1999].

ranging from 3 to 10 percent across the different interview periods, with similar rates for men and women. Within this range, the rates generally declined quite significantly from two to five years following graduation, from 8-10 percent down to 3-6 percent over this three year interval. Interestingly, the rates show no clear trend across cohorts, with the rates for the first set of graduates similar to those of the last (interviewed at roughly comparable points in the business cycle).[16]

Table 5: Unemployment Rates

	1982 Cohort		1986 Cohort		1990 Cohort	
	1984	1987	1988	1991	1992	1995
	%	%	%	%	%	%
All	**9**	**3**	**10**	**6**	**9**	**3**
Males						
All	**8**	**3**	**10**	**6**	**9**	**3**
No Specialization	9	-	13	3	11	2
Elem./Secon. Teaching	8	1	4	3	5	2
Other Education	6	5	6	7	10	3
Fine Arts & Humanities	16	4	20	5	13	3
Commerce	6	3	7	7	9	3
Economics	9	6	15	9	10	5
Law	15	0	1	0	7	0
Other Social Sciences	8	3	23	6	13	6
Agric. & Bio. Sc.	11	6	16	13	15	2
Veterinary	-	-	17	-	-	-
Engineering	7	2	8	5	7	1
Medical Professions	4	1	2	0	4	3
Other Health	3	0	3	3	7	2
Computer Science	5	0	3	5	3	5
Math. & Other Phys. Sc.	8	8	7	12	10	4
Females						
All	**9**	**4**	**10**	**5**	**9**	**3**
No Specialization	24	-	18	1	13	10
Elem./Secon. Teaching	11	2	8	8	6	2
Other Education	11	8	4	5	17	1
Fine Arts & Humanities	14	6	14	11	10	8
Commerce	6	0	8	5	8	4
Economics	-	-	4	10	6	-
Law	16	0	9	0	26	3
Other Social Sciences	9	4	13	5	10	3
Agric. & Bio. Sc.	15	3	17	5	12	3
Veterinary	-	-	7	-	8	-
Engineering	4	9	6	9	10	1
Medical Professions	3	1	2	1	2	2
Other Health	4	3	2	2	2	2
Computer Science	6	0	2	0	6	0
Math. & Other Phys. Sc.	5	4	12	3	14	4

Note: In this and all following tables, the samples exclude those who obtained a new diploma by the relevant interview or who stated that they were part-time workers because they were students.

[16] See Finnie [1999b] for further discussion of employment and earnings patterns amongst graduates by sex and level of education (College, Bachelor's, Master's, Doctorate).

There was, not surprisingly, great variation in the unemployment rates by field. The generally low unemployment fields include teaching (except for female graduates in 1984 and 1991), engineering (except female graduates in 1991), medical professions, other health, and computer science. The next tier of medium and more mixed rates includes other education (mixed), commerce (tending towards the lower side of average), economics (more on the higher side), law (the most boom-and-bust record), general social sciences (again tending towards the above average, but with large spikes in certain years), and mathematics and physical sciences (quite mixed). The generally high unemployment fields include fine arts and humanities, which was predictable, and agricultural and biological sciences, which is perhaps more surprising.

Part-Time Employment

Rates of part-time employment (Table 6) have been much higher for women than men: over all fields, the rates amongst female graduates were between 11 and 14 percent, versus 3 to 7 percent for men.[17] Furthermore, these gender differences grew in the years following graduation, with the proportion of female graduates in part-time jobs dropping just one percentage point from the first interview to the second in each case, while the males' rates declined 2 to 4 points from their already lower levels. The men's rates undoubtedly primarily reflect current employment opportunities, and the improvements in these conditions in the years following graduation, while the women's rates also reflect labour supply decisions related to having and raising children, other family influences, and other factors which have traditionally led to a generally looser labour force attachment.[18]

Another general observations is that – like the unemployment rates – there is no clear trend in the rates of part-time work across cohorts, with comparisons of the first and last sets of graduates indicating slightly lower – not higher – rates for the later group in three of the four cases (males and females as of two and five years following graduation). At a time when it is often taken for granted that there have been increases in "non-standard work" in general – especially amongst the young – the data provide no empirical evidence of this phenomenon in the form of part-time work amongst Bachelor's level university graduates.

[17] Recall that individuals working part-time precisely because they were in school are not included in the analysis.

[18] Finnie [1999c] shows that women were much less likely to be in part-time jobs involuntarily than were men, and that the involuntarily part-time rates generally declined significantly from the first interview to the second (as employment opportunities generally improved) for each cohort of female graduates.

Turning to the patterns by discipline, the results would seem to suggest certain differences in the structure of employment opportunities for different sets of graduates, especially when the part-time rates are viewed along side the unemployment rates seen above. For example, commerce, economics, and law graduates are almost uniformly characterised by low rates of part-time work – low in absolute levels and/or low relative to what their unemployment rates might have suggested in terms of demand side forces. Rates of part-time work amongst law graduates were, for example, very low even in the years when unemployment rates were relatively high. In short, there would appear to have been less scope for the part-time option in general – there was either a full-time job available, or there was no job at all. These patterns are especially strong for men, but largely hold for women as well.

The other fields tending to have low rates of part-time work were perhaps more predictable in this respect, as they were also characterised by generally low unemployment rates: engineering, medical professions, other health, computer science. The generally full-time nature of the jobs found by graduates in these disciplines would, therefore, appear to be the result of the combination of i) the generally good employment opportunities available in these areas, ii) the desire of employers to hire workers on a full-time basis, and iii) the preferences of graduates to work on a full-time basis.

Returning to the "flexibility of employment options" issue, the reverse to the situation described for graduates in commerce, economics, and law would appear to hold for teaching, other education, and fine arts and humanities, where the rates of part-time work have varied to a much more significant degree and have generally moved (inversely) with demand conditions. The labour market for graduates in these disciplines would, therefore, appear to have been more flexible in terms of employment status, with recessionary periods characterised by increases in the relative number of part-time job opportunities. A more detailed analysis of full-time and part-time employment patterns by occupation would be required to identify these particular dynamics – thus telling us something of interest and importance regarding the structure of these various sub-markets for the graduates of each field of study.

Table 6: Percentage of Workers in Part-Time Jobs

	1982 Cohort		1986 Cohort		1990 Cohort	
	1984	1987	1988	1991	1992	1995
	%	%	%	%	%	%
All	**9**	**7**	**7**	**6**	**8**	**6**
Males						
All	**5**	**2**	**4**	**2**	**6**	**3**
No Specialization	3	-	5	3	12	1
Elem./Secon. Teaching	16	5	8	2	9	5
Other Education	15	4	2	4	20	10
Fine Arts & Humanities	13	8	11	4	13	5
Commerce	2	1	3	0	3	2
Economics	2	0	4	2	4	3
Law	2	0	3	0	0	1
Other Social Sciences	8	4	5	4	8	2
Agric. & Bio. Sc.	6	1	4	1	4	5
Veterinary	-	-	0	-	-	-
Engineering	1	1	1	1	1	1
Medical Professions	1	2	5	1	4	3
Other Health	2	2	0	2	1	3
Computer Science	1	0	1	2	1	0
Math. & Other Phys. Sc.	7	1	3	0	6	2
Females						
All	**12**	**12**	**11**	**11**	**10**	**10**
No Specialization	21	-	6	6	9	6
Elem./Secon. Teaching	24	21	17	15	11	9
Other Education	20	14	22	14	21	21
Fine Arts & Humanities	18	10	17	16	13	11
Commerce	3	5	3	5	5	3
Economics	-	-	7	7	3	-
Law	1	5	4	6	4	6
Other Social Sciences	10	10	11	10	13	13
Agric. & Bio. Sc.	13	7	10	10	6	3
Veterinary	-	-	14	-	6	-
Engineering	3	1	1	10	1	1
Medical Professions	2	12	3	4	8	10
Other Health	5	15	11	16	8	16
Computer Science	0	4	2	6	2	0
Math. & Other Phys. Sc.	4	1	4	8	7	2

It is also worth noting that the disciplines associated with more flexible employment options – for men and women alike – are also generally those dominated by women. It is interesting to speculate as to whether the presence of women has perhaps made those particular labour markets more amenable to "non-standard" work conditions more generally – which would be a quite interesting institutional dynamic, with a range of implications, including what might be predicted for labour markets related to disciplines where the numbers of female graduates have been increasing, such as commerce and law.

Turning to the other disciplines, part-time rates amongst social science graduates (apart from economics) have tended to be above average for men, but about in the middle for women; the agricultural and biological sciences rates have generally been in the middle range for men and women alike; while for mathematics and physical sciences, the rates have been about average for men, but very low for women. The latter result is especially interesting – perhaps part-time work is less of an option for women trying to crack the hard sciences; alternatively, perhaps these disciplines attract the sort of women who are particularly focused on their careers and are thus less interested in working part-time.

Temporary Employment

Table 7 shows the percentage of graduate with jobs who were in temporary jobs as of each survey. Women were more commonly in temporary jobs than men, but any simple supply-side explanation comes up against the fact that for the one year such data are available, the proportions of men and women in temporary jobs voluntarily were similarly low (figures not reported here, see Finnie [1999c]). In short, temporary employment would appear to generally be due to the absence of permanent jobs, and the results reported here should be interpreted in this context.

With respect to the dynamics of temporary employment, there were uniformly large declines from two to five years following graduation. For graduates of all fields taken together, the men's rates fell from the 18 to 21 percent range to 5 to 9 percent, while for women the rates fell from the 22 to 27 percent range to 9 to 13 percent, presumably again reflecting the improvements in job opportunities over this interval. There was, however, something of a shift in these dynamics – and the second period levels –over time: while the percentages of graduates with temporary jobs as of two years following graduation were lower in each subsequent cohort, the reverse was true as of the five year rates.[19]

[19] See Finnie [1999c] for further investigation of this dynamic at a more aggregate level (*i.e.*, by level of study rather than field).

Table 7: Percentage of Workers in Temporary Jobs

	1982 Cohort		1986 Cohort		1990 Cohort	
	1984	1987	1988	1991	1992	1995
	%	%	%	%	%	%
All	**24**	**7**	**21**	**10**	**20**	**11**
Males						
All	**21**	**5**	**18**	**7**	**18**	**9**
No Specialization	38	-	26	19	27	4
Elem./Secon. Teaching	38	8	34	14	23	11
Other Education	34	6	28	13	34	19
Fine Arts & Humanities	35	14	29	8	29	11
Commerce	6	1	10	3	11	8
Economics	18	4	17	0	14	5
Law	10	6	9	1	8	3
Other Social Sciences	32	9	30	12	22	10
Agric. & Bio. Sc.	35	6	29	8	30	14
Veterinary	-	-	23	-	-	-
Engineering	13	2	10	4	10	4
Medical Professions	56	16	31	26	41	29
Other Health	17	3	15	0	10	4
Computer Science	5	4	7	4	9	8
Math. & Other Phys. Sc.	23	3	14	3	17	5
Females						
All	**27**	**9**	**24**	**13**	**22**	**12**
No Specialization	25	-	29	8	38	10
Elem./Secon. Teaching	43	17	35	16	17	11
Other Education	46	12	40	23	39	33
Fine Arts & Humanities	33	8	30	16	26	15
Commerce	11	4	6	4	10	6
Economics	-	-	14	5	9	-
Law	16	0	23	8	20	3
Other Social Sciences	25	7	25	15	31	12
Agric. & Bio. Sc.	27	9	30	11	24	18
Veterinary	-	-	35	-	12	-
Engineering	25	21	21	9	11	9
Medical Professions	69	16	48	33	43	12
Other Health	7	5	11	10	13	12
Computer Science	4	4	7	2	16	8
Math. & Other Phys. Sc.	7	2	15	8	19	4

As for the patterns by field, the findings for temporary work are fairly similar to those for part-time work – perhaps driven by similar factors related to labour demand and institutional arrangements. Thus, fields characterised by lower rates of temporary employment include commerce, economics, law, engineering, computer science, and mathematics and other physical sciences (the latter for women only). The other fields tend to have higher rates, although the patterns are fairly mixed – presumably reflecting the various demand, supply, and institutional influences at play. Medical professions appears at first to be an outlier case, but the relatively

high rates found here probably reflect internships, residencies, and other such standard transitional elements of careers in these areas.

Self-Employment

Being self-employed – as opposed to being a wage or salary worker – could be for one of two broad reasons: i) not being able to find suitable employment of a more conventional status, ii) preferring self-employment for personal reasons or the short-term monetary benefits and/or enhanced longer-term career opportunities which can accrue.[20] The NGS surveys do not, unfortunately, contain the information which would facilitate an analysis which addressed these elements, thereby leaving us with the simple rates shown in Table 8.

The percentage of individuals who were self-employed varies between 6 and 10 percent for all graduates taken together, with rates generally twice as great for men (7 to 13 percent) as women (3 to 7 percent). The rates generally increased from two years following graduation to five years out. Given that labour market opportunities generally tended to improve over this interval (as seen above), these results would seem to suggest that self-employment has more often stemmed from the advantages of the self-employment option rather than the lack of suitable opportunities with respect to wage and salary positions – at least at the margin. No cross-cohort trends are evident.

The patterns by field are mostly quite predictable, but also include a few surprises. Thus, by far the highest rates were amongst doctors and lawyers, with veterinarians following somewhat behind, presumably reflecting the private practice option for these professionals. Perhaps more surprising are the consistently higher than average rates among fine arts and humanities graduates, although a more detailed analysis would be required to find out what is driving this outcome: independent artists? cab-driving philosophy majors? English majors who have become by-the-hour editors? Also of surprise are the relatively high rates amongst agricultural and biological science graduates in certain years, especially for men – with no obvious explanation for this finding. Beyond this, the rates are all moderate to low.

[20] A conventional economic approach would typically begin by modelling the choice of class of employment in terms of the present value of each of the options (including all future monetary and non-monetary returns) along with the availability of each type of employment, with the individual then maximising over the relevant choice set.

Table 8: Percentage of Workers Self-Employed

	1982 Cohort		1986 Cohort		1990 Cohort	
	1984	1987	1988	1991	1992	1995
	%	%	%	%	%	%
All	**6**	**10**	**5**	**10**	**6**	**10**
Males						
All	**9**	**12**	**7**	**12**	**8**	**13**
No Specialization	2	-	3	13	4	13
Elem./Secon. Teaching	0	1	2	4	0	1
Other Education	0	0	6	7	0	6
Fine Arts & Humanities	8	13	10	17	14	18
Commerce	4	6	5	9	7	8
Economics	7	10	12	17	9	13
Law	28	34	12	16	19	43
Other Social Sciences	9	9	3	11	7	16
Agric. & Bio. Sc.	17	21	10	10	6	19
Veterinary	-	-	15	26	-	-
Engineering	2	4	3	3	5	6
Medical Professions	55	69	37	62	33	63
Other Health	29	50	14	33	12	25
Computer Science	3	4	3	9	4	4
Math. & Other Phys. Sc.	4	8	4	2	8	6
Females						
All	**4**	**7**	**3**	**7**	**4**	**6**
No Specialization	2	-	0	6	2	7
Elem./Secon. Teaching	0	2	0	4	1	2
Other Education	2	2	2	2	2	3
Fine Arts & Humanities	8	9	5	13	7	13
Commerce	2	7	1	4	3	3
Economics	-	-	4	4	0	-
Law	16	37	11	16	12	26
Other Social Sciences	2	1	2	7	4	4
Agric. & Bio. Sc.	4	8	5	5	7	6
Veterinary	-	-	18	-	15	-
Engineering	0	0	2	8	2	3
Medical Professions	28	58	30	48	39	60
Other Health	3	4	1	4	3	4
Computer Science	5	6	1	2	0	2
Math. & Other Phys. Sc.	0	2	2	8	0	2

3.5 Skill and Qualifications Matches

The Job-Education Skill Match Index

Table 9 reports the mean scores of the job-education skill match index, with higher values indicating greater use of the skills learned in the program from which the individual graduated in the current job. As previously noted, the results should be directly comparable across interview years for a given cohort, and between the first two cohorts, but not between the first two and last groups of graduates due to changed response options given in the NGS questionnaire. Most

importantly for the present analysis, the results should be directly comparable across disciplines in every case.

Table 9: Index of the Job-Education Skill Match

	1982 Cohort		1986 Cohort		1990 Cohort	
	1984 %	1987 %	1988 %	1991 %	1992 %	1995 %
All	**82**	**88**	**83**	**87**	**70**	**71**
Males						
All	**82**	**89**	**83**	**87**	**69**	**70**
No Specialization	80 [b]	-	85 [a]	83 [a]	56 [a]	58 [a]
Elem./Secon. Teaching	97	89 [a]	92	91	83	79
Other Education	78 [a]	76 [a]	80 [a]	80 [a]	71 [a]	73 [a]
Fine Arts & Humanities	65 [a]	72 [a]	72	71 [a]	59	62
Commerce	87	94	88	94	74	74
Economics	70 [a]	80 [a]	65 [a]	72 [a]	53	53
Law	96	100	94	94	84 [a]	86
Other Social Sciences	64 [a]	80	57 [a]	72 [a]	54	59
Agricultural & Bio. Sc.	75 [a]	83 [a]	70 [a]	80 [a]	63 [a]	58 [a]
Veterinary	-	-	95 [a]	-	-	-
Engineering	91	94	94	95	73	72
Medical Professions	100	100	98	98	97	98
Other Health	93 [a]	96 [a]	93 [a]	100	90	87 [a]
Computer Science	92	95	92	94	80	75
Math. & Other Phys. Sc.	84 [a]	89 [a]	80	79 [a]	62	64 [a]
Females						
All	**82**	**87**	**84**	**87**	**71**	**72**
No Specialization	69 [b]	-	77 [a]	82 [a]	60 [a]	54 [a]
Elem./Secon. Teaching	91	91	93	91	80	74
Other Education	84 [a]	84 [a]	83	91	75	74
Fine Arts & Humanities	75	80	77	81	63	64
Commerce	87	93	89	86	71	71
Economics	-	-	73 [a]	90 [a]	44 [a]	-
Law	84 [a]	94 [a]	96	99	85 [a]	82
Other Social Sciences	67	79	71	80	60	67
Agricultural & Bio. Sc.	85 [a]	89 [a]	74 [a]	78 [a]	66	64
Veterinary	-	-	73 [c]	-	79 [a]	-
Engineering	88 [a]	94 [a]	89 [a]	97	71	72
Medical Professions	99	97	98	94	97	95
Other Health	97	98	95	96	90	90
Computer Science	88 [b]	94 [a]	94	96	80 [a]	82 [a]
Math. & Other Phys. Sc.	85 [a]	94 [a]	86 [a]	93 [a]	61 [a]	69 [a]

Note: The means with no letter subscript have standard errors below 1, those with an *a* have standard errors between 1 and 2, those with a *b* have standard errors between 2 and 3, and those with a *c* have standard errors greater than 3.

The reported scores imply that the great majority of graduates were to at least some degree using skills learned at school in their current jobs. The mean scores in the 82 to 87 point range for the earlier cohorts (1984/87, 1988/91) represent corresponding percentages of graduates who responded in the affirmative to the simple "yes"/"no" question regarding their use of the skills learned at school in the current job, while the 69 to 72 point range for the 1990 cohort (1992/95)

represents an average response of slightly more than "to some extent" where the other options were "not at all" "very little", and "to a great extent" (see Appendix B).

Perhaps surprisingly, there were no dramatic changes in the index scores from two to five years following graduation – but this could reflect the nature of the underlying question and the construction and interpretation of the resulting measure more than the actual underlying job-education skill match relationship *per se* (however that might be defined).[21]

The cross-discipline patterns are generally not too surprising. Once again the professional fields scored well, including teaching, commerce, law (very high), medical professions (again very high), other health, computer science, and engineering (although considerably less so in the latest cohort, especially for men). Fields with consistently lower scores include fine arts and humanities, economics, other social sciences, and agricultural and biological sciences (except for female graduates of the first cohort) – fields which, again, are either not particularly linked to the development of specific job market skills, or for which a career in the area typically requires an advanced degree, leaving these Bachelor's level graduates on uncertain ground in terms of career options related to their fields of specialisation. Fields with middle rank or more mixed scores include other education, veterinary sciences (a bit of a surprise), and mathematics and physical sciences.

Educational Pre-requisites and Graduates' Qualifications

The job-education *credentials* match is represented here by the percentage of graduates who were over-qualified for their jobs, shown in Table 10. Overall, a substantial proportion of graduates appear to have been over-qualified for their jobs, with these rates varying from 25 to 34 percent across the various periods for all graduates taken together. These results could, however, at least partly reflect a certain ambiguity regarding the formal educational prerequisites

[21] To start, the underlying concept is problematic – what is a "skill"? Secondly, how well can graduates identify the "skills" learned at school, the skills used in the job, and the relationship between the two? Thus, while the question that was posed is reasonable, the results need to be interpreted with care. For example – and with regard to the dynamic element in particular – it is possible that by five years after finishing their programs, graduates have largely forgotten what it was that they learned in school and have difficulty in differentiating their current skill sets in terms of what was developed during their formal schooling, what was gained on the job, and what was a combination of the two. It is also possible that some graduates were using different skills than those which were gained at school, but ones which could never have been developed except by building upon that more fundamental base. – how would such graduates respond? In short, there is information in these results – after all, the responses are hardly random, and the results generally make sense – but it needs to be used carefully.

versus the true requirements of many jobs. It might, for example, often be the case that a Bachelor's degree is not officially required, but is needed to successfully compete for a position – a case which would be registered as an "over-qualification". The results should, therefore, be meaningful, but be interpreted with some caution.

Table 10: Percentage of Workers Over-Qualified and Under-Qualified

	1982 Cohort				1986 Cohort				1990 Cohort			
	1984		1987		1988		1991		1992		1995	
	Over	Under	Over	Under	Over	Under	Over	Under	Over	Under	Over	Under
	%	%	%	%	%	%	%	%	%	%	%	%
All	**33**	**2**	**27**	**3**	**34**	**3**	**27**	**4**	**27**	**3**	**25**	**3**
Males												
All	**31**	**2**	**27**	**4**	**31**	**3**	**26**	**4**	**27**	**3**	**25**	**3**
No Specialization	47	3	-	-	35	2	39	8	48	0	56	0
Elem./Secon. Teaching	22	3	14	3	13	6	11	6	6	4	8	2
Other Education	46	1	46	0	37	0	23	1	30	2	31	2
Fine Arts & Humanities	54	10	45	10	51	4	40	4	52	7	48	7
Commerce	32	0	30	4	32	1	33	3	24	1	23	4
Economics	48	0	46	0	48	4	32	6	36	3	35	2
Law	4	0	4	11	21	5	18	1	6	2	11	5
Other Social Sciences	56	0	50	2	61	2	50	5	52	3	47	5
Agricultural & Bio. Sc.	36	3	44	2	40	5	37	7	41	2	38	3
Veterinary	-	-	-	-	-	-	-	-	-	-	-	-
Engineering	15	0	11	2	16	1	14	3	11	2	12	1
Medical Professions	0	34	-	-	3	19	1	24	1	12	-	-
Other Health	5	2	4	0	16	7	8	14	14	3	16	6
Computer Science	28	0	19	1	19	1	20	2	12	1	13	1
Math. & Other Phys. Sc.	24	1	19	3	30	4	19	7	28	3	28	1
Females												
All	**32**	**1**	**26**	**3**	**37**	**2**	**28**	**4**	**27**	**3**	**24**	**3**
No Specialization	43	0	-	-	43	0	35	0	48	3	30	5
Elem./Secon. Teaching	19	0	12	3	16	6	11	4	4	4	4	2
Other Education	23	0	17	6	26	1	22	2	25	2	29	4
Fine Arts & Humanities	52	2	44	4	61	2	40	6	45	2	45	3
Commerce	33	0	28	3	34	1	34	1	29	2	23	2
Economics	-	-	-	-	46	0	32	0	-	-	-	-
Law	21	0	9	3	4	2	1	2	7	8	-	-
Other Social Sciences	53	1	42	2	50	3	35	5	39	2	36	5
Agricultural & Bio. Sc.	28	0	26	2	34	1	26	5	32	2	30	0
Veterinary	-	-	-	-	-	-	-	-	-	-	-	-
Engineering	15	0	7	3	19	3	7	6	12	1	18	1
Medical Professions	0	25	-	-	2	11	3	27	0	6	1	23
Other Health	25	1	19	4	44	2	38	5	29	2	24	1
Computer Science	10	0	8	0	20	0	18	2	18	2	13	3
Math. & Other Phys. Sc.	27	0	31	0	25	4	38	3	26	6	9	7

Being over-qualified was somewhat more common amongst women than men for the 1986 cohort, but not for the other sets of graduates. The rates generally declined a little from the first interview to the second, consistent with graduates gaining promotions and generally moving into positions where they were being given more scope to work up to their qualifications. There was perhaps a tendency towards moderately lower rates of over-qualification for the most recent

group of graduates relative to the earlier ones, and while it is again difficult to know exactly how to interpret this finding, we can at least say it offers no support for the notion that the quality of jobs found by graduates has deteriorated over time.[22]

By discipline, the professions show the best job-education qualification matches, with the fields with low rates of over-qualification including teaching, law, engineering, medical professions, and computer science. Fields with medium or more mixed rates include other education, commerce (perhaps a bit of a surprise), agricultural and biological sciences (women), and mathematics and other physical sciences. Fields tending to have higher rates of over-qualification include fine arts and humanities, economics, other social sciences, agricultural and biological sciences (men), and other health (only women's rates reportable).

3.6 Earnings and Job Satisfaction

Earnings Levels and Growth Rates

Table 11 reports the mean real earnings of graduates in constant 1995 dollars. Over all fields, mean earnings ranged from the mid-30,000s to mid-40,000s for men, and from just under the $30,000 mark to $36,000 for women, including substantial increases from two to five years following graduation (see the relevant columns in the table).

Over time, male graduates' mean earnings declined for each cohort relative to the preceding one, with the third cohort's earnings levels being 5.9 percent lower than those of the first cohort's as of the first interview, and down 8.1 percent as of the second interview. For women, on the other hand, earnings either held steady or rose for each set of graduates, finishing 8.3 percent higher as of the first interview and 1.4 percent higher as of the second interview.

Appendix C includes alternative earnings results, with Table A1 reporting the medians for all workers, and Tables A2 and A3 showing the means and medians for full-time workers only (thus controlling for labour supply effects). While the levels of earnings vary to some degree across the different sets of results, the general patterns are generally similar: significant increases from

[22] On the other hand, the apparently increasing educational levels required in the jobs graduates have been finding could also represent "qualification creep" – in a weak labour market, requirements may have been arbitrarily raised for some positions.

the first interview to the second, cross-cohort decreases for men and small rises or stability for women, and so on.

Table 11: Mean Earnings (1995 Constant Dollars)

	1982 Cohort			1986 Cohort			1990 Cohort		
	1984	1987	Change	1988	1991	Change	1992	1995	1995
	$	$	%	$	$	%	$	$	%
All	**32,300**	**41,200**	**28**	**32,400**	**40,200**	**24**	**32,400**	**39,200**	**21**
Males									
All	**35,600**	**46,700**	**31**	**35,300**	**44,400**	**26**	**33,500**	**42,900**	**28**
No Specialization	25,100 [a]	-	-	34,600 [a]	44,700 [a]	29	30,800 [a]	37,800 [a]	23
Elem./Secon. Teaching	33,500	38,800	16	34,300	38,100	11	34,000	37,600	11
Other Education	28,500	34,300	20	31,800	38,300	20	28,000	35,100	25
Fine Arts & Humanities	26,000	38,100 [a]	47	28,500	35,100	23	24,900	32,400	30
Commerce	35,200	44,800	27	35,000	44,400	27	33,300	42,800	29
Economics	32,200	45,400 [a]	41	33,100 [a]	39,600	20	33,100	44,200 [a]	34
Law	38,400 [a]	56,300 [a]	47	36,600	58,900 [a]	61	37,100	52,100 [a]	40
Other Social Sciences	30,700	41,100	34	29,900	36,200	21	28,500	36,800	29
Agricultural & Bio. Sc.	31,100	42,400 [a]	36	27,200	39,800	46	28,700 [a]	34,800 [a]	21
Veterinary	-	-	-	39,000 [b]	-	-	-	-	-
Engineering	38,600	46,400	20	37,000	45,300	22	37,500	45,900	22
Medical Professions	68,200 [b]	101,200 [b]	48	68,700 [b]	84,900 [b]	24	54,400 [b]	88,900 [b]	63
Other Health	51,900 [b]	69,200 [b]	33	47,100 [b]	56,700 [b]	20	45,500 [a]	51,300 [a]	13
Computer Science	39,300	48,100	22	34,300	43,600	27	37,800	46,300	22
Math. & Other Phys. Sc.	36,100	46,700	29	34,300	44,700	30	35,200	44,500 [a]	26
Females									
All	**28,900**	**35,400**	**22**	**29,700**	**36,000**	**21**	**31,300**	**35,900**	**15**
No Specialization	24,600 [a]	-	-	28,200 [a]	33,700	20	24,700	34,600 [a]	40
Elem./Secon. Teaching	27,800	31,700	14	29,400	33,200	13	32,600	35,800	10
Other Education	26,800	32,600	22	27,000	31,900	18	26,300	29,600	13
Fine Arts & Humanities	23,900	30,800	29	24,300	29,400	21	27,400	31,400	15
Commerce	30,100	37,700	25	30,800	39,100	27	31,300	37,000	18
Economics	-	-	-	29,000	33,700	16	29,800 [a]	-	-
Law	31,700	48,500 [a]	53	35,900	48,400 [a]	35	38,400	55,300 [b]	44
Other Social Sciences	25,700	31,600	23	26,400	33,200	26	27,600	31,700	15
Agricultural & Bio. Sc.	27,500	33,300	21	25,100	32,200 [a]	28	27,800	32,900	18
Veterinary	-	-	-	-	-	-	33,000 [a]	-	-
Engineering	34,700	42,000 [a]	21	35,200	42,000	19	38,200 [a]	42,700	12
Medical Professions	48,200 [a]	78,200 [b]	62	54,900 [b]	69,900 [b]	27	55,300 [b]	71,300 [b]	29
Other Health	36,000	39,200	9	35,200	38,000	8	37,900	40,000	6
Computer Science	38,500 [a]	45,600 [a]	18	32,100	41,100	28	36,100 [a]	41,800 [a]	16
Math. & Other Phys. Sc.	33,500	41,600 [a]	24	32,200	39,700	23	31,200	39,200 [a]	26

Note: The means with no letter subscript have standard errors below 500, those with an *a* have standard errors between 500 and 1000, and those with a *b* have standard errors between 1000 and 2000.

By field of study, the numbers in Table 11 and Figures 1 and 2 reveal some relatively clear patterns. (Again see Appendix C for the comparable median results, including the associated graphs, as well as some findings for full-time workers only.) The clear earnings leaders are – not surprisingly – medical professionals, with this advantage rising substantially from two to five years following graduation, especially for the first and last cohorts (see their relatively high earnings growth rates in those years). The second tier fields include law (especially as of the second interviews for each cohort), veterinary sciences, engineering, computer science, other

health disciplines, and (less consistently) mathematics and physics graduates. The next rank includes teaching, commerce, and economics, while the fields with the lowest earnings levels include other education, arts and humanities, general social sciences, and agricultural and biological sciences.

Figure 1: Mean Earnings, First Interviews (1995 Constant Dollars)

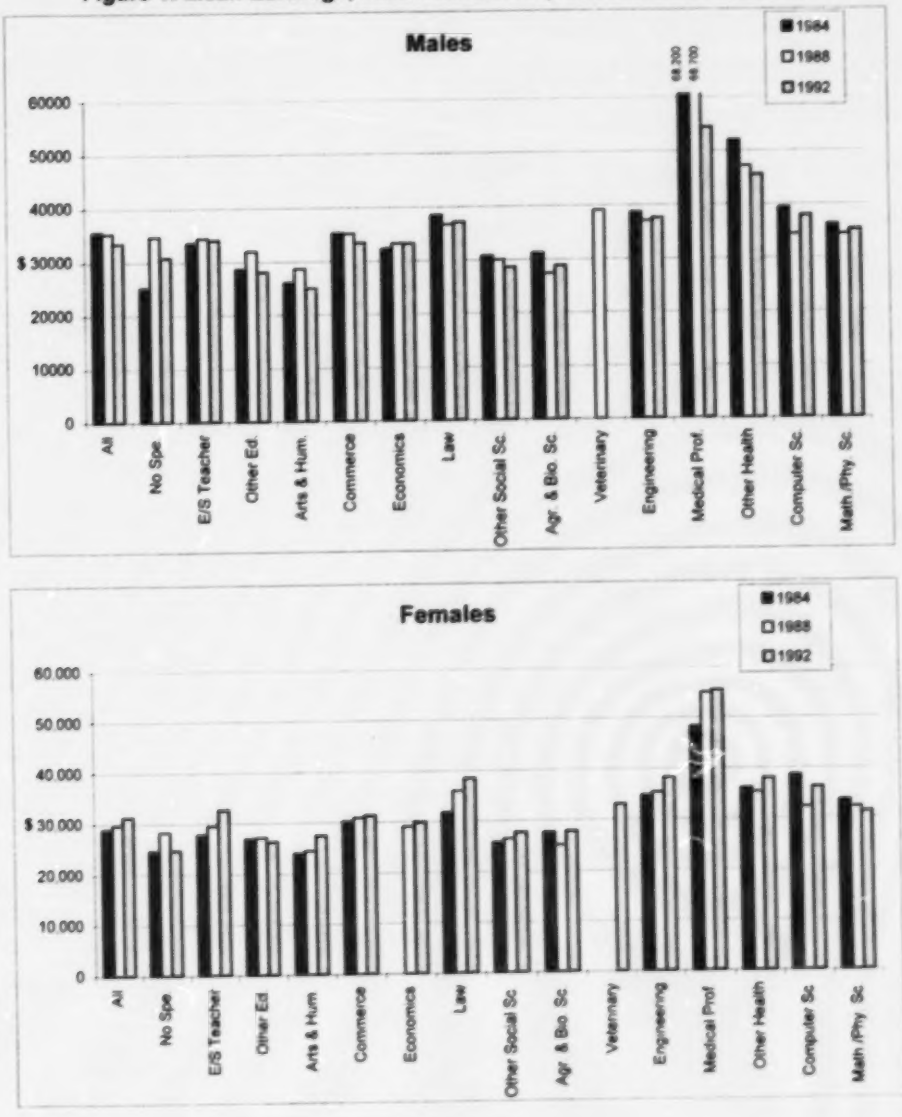
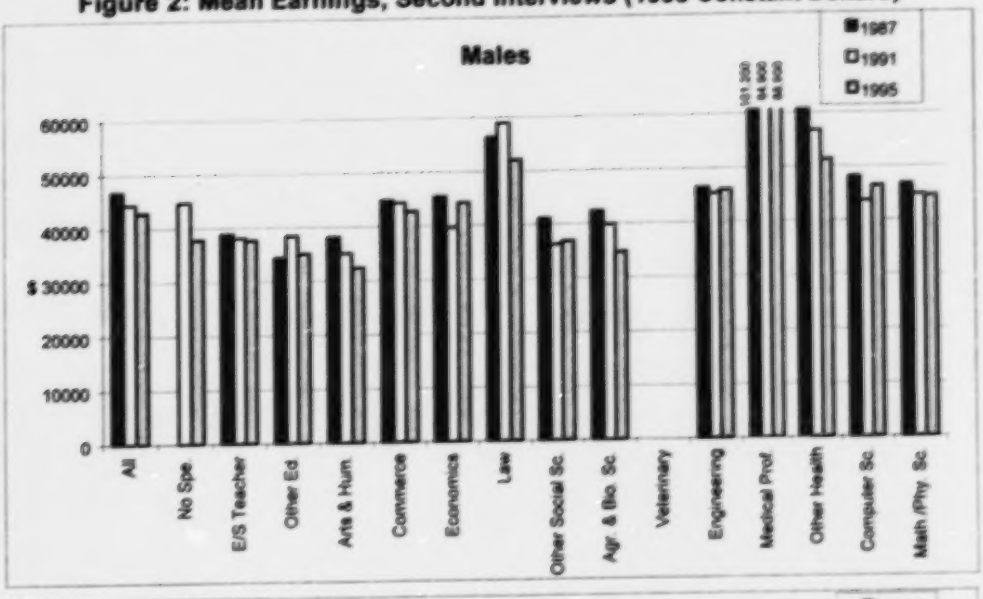
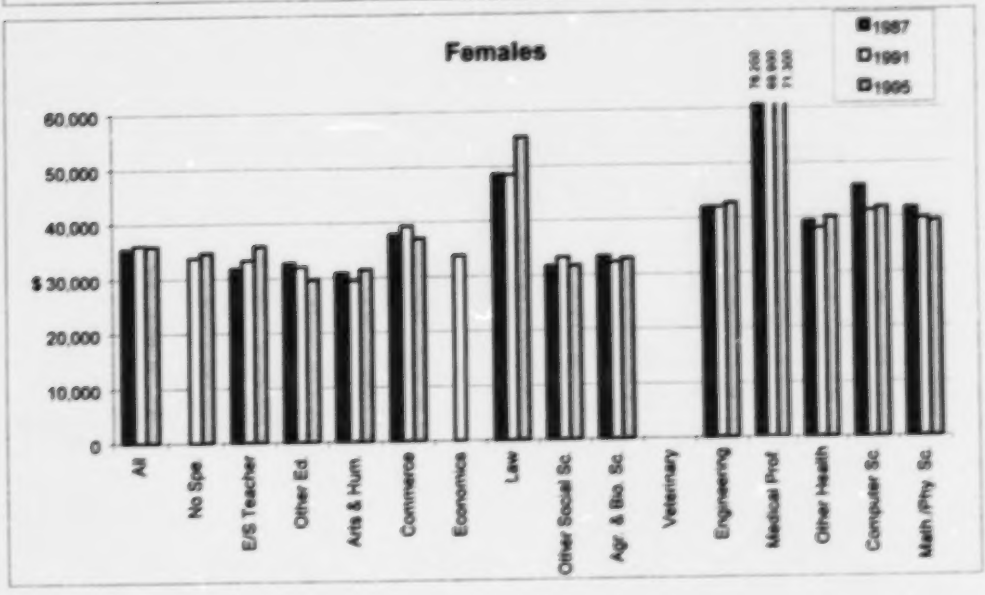


Figure 2: Mean Earnings, Second Interviews (1995 Constant Dollars)





Regarding growth rates from two to five years following graduation, medical and law graduates of both sexes typically had amongst the largest increases in earnings (except for male doctors in the middle cohort), while teachers had amongst the smallest gains, along with engineers in the case of men, and other health graduates on the female side – thus giving us an idea of the longer-term earnings profiles (the slopes along with the levels) amongst different sets of graduates.

Job Satisfaction

Table 12 shows graduates' levels of satisfaction with their earnings levels according to the index constructed for these purposes described earlier. To some degree, the earnings satisfaction results conform to the patterns of actual earnings levels just seen, but the differences are not so great and there are clearly many departures from any strict rule in this regard. Thus, the most earnings-satisfied graduates tend to have been those in the medical professions, other health (men only), computer science, and mathematics and the physical sciences – all amongst the higher paying fields – but law and engineering graduates (especially men) are not as consistently satisfied with their earnings as their higher than average levels might have suggested, some of the low paying disciplines are characterised by satisfaction scores which belie their diminutive levels of remuneration in at least some years, some of the disciplines in the middle rank of actual earnings have amongst the lowest satisfaction scores in certain periods, and the differences in satisfaction levels are generally proportionally smaller than the differences in earnings levels (although this could be at least partly due to the nature of the underlying questions and the index which has been constructed therefrom).

Perhaps the most intriguing result, however, is that the levels of earnings satisfaction are very similar for men and women – despite the fact that men having significantly higher earnings levels (as seen above). Thus, the most general, interesting, and perhaps important general conclusion to draw from these results is that while many of the differences in earnings satisfaction scores are statistically significant and there is obviously a relationship between actual earnings levels and individuals' satisfaction with those rates of pay, other factors are involved, including – presumably – *expectations*, which presumably vary by discipline, while the closeness of the male-female satisfaction scores perhaps represent the clearest and most interesting manifestation of that dynamic.

Roughly similar comments might be made about the overall job satisfaction scores shown in Table 13. Many of the differences are statistically significant but there is clearly a general correlation between earnings levels and overall job satisfaction, however that relationship is far from perfect with many interesting outliers (see, for example, teachers); and there is generally much less cross-discipline variation in the overall job satisfaction earnings scores than in actual earnings levels – although more here than with the earnings satisfaction measure.

Table 12: Index of Job Satisfaction - Earnings

	1982 Cohort		1986 Cohort		1990 Cohort	
	1984	1987	1988	1991	1992	1995
	%	%	%	%	%	%
All	**65**	**67**	**62**	**67**	**67**	**66**
Males						
All	**66**	**67**	**64**	**67**	**67**	**66**
No Specialization	61 [a]	-	64	66	66 [a]	67 [a]
Elem./Secon. Teaching	71	67	67	68	77	63
Other Education	65	58	62	64	70	66
Fine Arts & Humanities	63	66	67	67	59	57
Commerce	64	69	62	68	63	69
Economics	75	68	59	63	67	67
Law	67	72	65	68	64	66
Other Social Sciences	62	65	60	62	67	61
Agricultural & Bio. Sc.	65	65	62	65	64	66
Veterinary	-	-	64 [a]	-	-	-
Engineering	68	68	66	66	68	67
Medical Professions	70 [a]	74	71	68	71	74
Other Health	65 [a]	70 [a]	71 [a]	73 [a]	74 [a]	73 [a]
Computer Science	70	71	62	72	73	74
Math. & Other Phys. Sc.	68	73	67	67	68	67
Females						
All	**65**	**66**	**61**	**66**	**67**	**66**
No Specialization	56 [b]	-	57 [a]	72 [a]	63 [a]	72 [a]
Elem./Secon. Teaching	71	70	65	69	76	69
Other Education	66	69	62	66	64	64
Fine Arts & Humanities	60	66	57	67	64	66
Commerce	62	67	62	69	62	63
Economics	-	-	63	59 [a]	63 [a]	-
Law	71 [a]	69 [a]	68	68	63 [a]	71
Other Social Sciences	58	57	57	63	64	65
Agricultural & Bio. Sc.	64	63	58	63	65	68
Veterinary	-	-	61 [a]	-	70 [a]	-
Engineering	67 [a]	70 [a]	65 [a]	69	72	66
Medical Professions	72 [a]	70 [a]	65	67	70	73
Other Health	67	63	59	63	71	68
Computer Science	71 [a]	72 [a]	65	72	70 [a]	71 [a]
Math. & Other Phys. Sc.	68 [a]	71 [a]	67	72 [a]	73 [a]	68

Note: The means with no letter subscript have standard errors below 1, those with an *a* have standard errors between 1 and 2, those with a *b* have standard errors between 2 and 3, and those with a *c* have standard errors greater than 3.

Table 13: Index of Job Satisfaction - Overall

	1982 Cohort		1986 Cohort		1990 Cohort	
	1984	1987	1988	1991	1992	1995
	%	%	%	%	%	%
All	**77**	**80**	**77**	**81**	**80**	**80**
Males						
All	**78**	**81**	**78**	**81**	**80**	**81**
No Specialization	72 [a]	-	76	84	80 [a]	76 [a]
Elem./Secon. Teaching	84	83	83	80	90	86
Other Education	77	79	76	84	75	79
Fine Arts & Humanities	75	81	77	77	72	75
Commerce	77	80	76	82	79	80
Economics	80	81	75	79	79	83
Law	87	89	81	83	85	77
Other Social Sciences	70	80	72	77	77	80
Agricultural & Bio. Sc.	78	81	74	84	72	82
Veterinary	-	-	82 [a]	-	-	-
Engineering	80	79	79	80	81	81
Medical Professions	85 [a]	90	86	89	92	87
Other Health	82 [a]	84 [a]	83 [a]	87	88	82 [a]
Computer Science	81	83	80	79	83	83
Math. & Other Phys. Sc.	78	80	76	78	79	80
Females						
All	**75**	**79**	**76**	**81**	**80**	**80**
No Specialization	75 [a]	-	69 [a]	84	77 [a]	80
Elem./Secon. Teaching	80	81	80	82	89	86
Other Education	75	83	77	84	81	82
Fine Arts & Humanities	69	74	71	80	76	79
Commerce	73	77	75	81	74	77
Economics	-	-	74	75 [a]	-	-
Law	85 [a]	83	85	79	80	88
Other Social Sciences	71	75	73	80	74	74
Agricultural & Bio. Sc.	73	78	75	78	78	78
Veterinary	-	-	81 [a]	-	-	-
Engineering	82 [a]	81	78	80	80	79
Medical Professions	88	84 [a]	84	85	88	87
Other Health	80	79	79	79	83	80
Computer Science	82 [a]	90 [a]	79	81	81 [a]	73 [a]
Math. & Other Phys. Sc.	81	81 [a]	80	85	78 [a]	77

Note: The means with no letter subscript have standard errors below 1, those with an *a* have standard errors between 1 and 2, those with a *b* have standard errors between 2 and 3, and those with a *c* have standard errors greater than 3.

4. Conclusion

This paper has provided an empirical analysis of a range of post-graduation outcomes by major field of study based on three waves of the National Graduates Surveys of Canadian post-secondary graduates, each group interviewed two and five years following graduation in 1982, 1986, or 1990.

The first interesting finding is the relative stasis of the distribution of graduates by discipline, raising questions as to what is driving these patterns – relatively stable demand on the part of students, or supply side rigidities in the form of the universities offering relatively fixed numbers of places which have been slow to evolve.

The second significant result is that relatively large numbers of graduates have gone on to further studies, with the cross-discipline patterns and significant shifts over time leading to speculations regarding the role of current labour market conditions on the decision to continue on and (related) whether Canada has been obtaining the right mix of graduate students – overall, and by particular fields of study – especially in the context of the emerging "knowledge based economy."

The third and most important general finding is that many of the patterns of post-graduation outcomes conform to expectations, typically reflecting the different orientations of the various disciplines with respect to direct career preparedness, with the professions and other applied disciplines generally characterised by lower unemployment rates, closer skill and qualification matches, higher earnings, and so on. On the other hand, while the "applied" fields also tend to perform well in terms of the "softer", more subjective measures regarding job satisfaction and the overall evaluation of the chosen programme (would the graduate choose the same major again?), the findings also indicate that graduates' assessments of their post-graduation experiences and overall evaluations of the programmes from which they graduated are based on more than simply adding up standard measures of labour market "success", with the job satisfaction scores and – perhaps most interestingly – the overall programme evaluations often departing from what the objective measures (unemployment rates, earnings levels, *etc.*) might have predicted.

Thus, earnings satisfaction clearly depends on more than actual earnings levels in many cases (with the male-female results perhaps being especially clear in suggesting that "expectations" play a key role in this regard), overall job satisfaction departs from earnings levels to an even greater degree, and overall program evaluations appear to depend on other factors besides post-graduation employment opportunities and earnings levels. Perhaps the best example of this is the medium levels of overall satisfaction with the educational program expressed by fine arts and humanities graduates, generally placing them squarely above those of graduates in fields such as economics, other social sciences, and the pure and applied sciences, even though they typically did amongst the worst in terms of labour market outcomes.

As for the broader implications of these findings, it should be emphasized that encouraging individuals to choose one discipline or another, or prompting universities to expand enrolments in one area over another out of a desire to increase the number of contented and productive graduates according to the results presented here would guarantee nothing. These results pertain to the average (not marginal) outcomes for those who have previously chosen to apply to, been accepted in, and completed the indicated programs, and shifting applications and/or admissions would not necessarily lead to newcomers replicating the records of past graduates. For example, to shift students from, say, the general social sciences to teaching or engineering or fine arts and humanities would not necessarily lead to increases in post-graduation labour market outcomes in the case of the first two, or higher levels of overall satisfaction with the chosen discipline in the case of the latter.

In short, the results reported here represent the outcomes of a given set of choices by students and institutions alike, as well as the specific labour market conditions which prevailed over the relevant period, and any predictions of changed outcomes would have to take all these processes into account – a complicated exercise well beyond the scope of this paper. Nevertheless, the results should be useful from at least a descriptive point of view, and could at least point the way to further research in a variety of directions, from economics faculties investigating their relatively low evaluations, especially amongst women; to educational and labour market specialists conducting more detailed analyses of the relationships between individuals' labour market experiences and their overall program evaluations; to institutions studying the slow moving nature of the distribution of their graduates by discipline or their gender differentiated

enrolment patterns in the light of the observed post-graduation outcomes; to education and labour market policy makers addressing the large questions of how to best spend post-secondary dollars in ways which will make for contented and productive graduates; and so on. It is hoped that the present study will help provide a useful starting point for these and other future investigations.

Appendix A

Field of Study Classifications

The field of study classifications used in the analysis are as follows:

No Specialization

Either truly no specialisation or one too general to be fit into the other categories (just 2-4 percent of the samples).

Elementary/Secondary Teacher

Straightforward.

Other Education

Includes all types of fields related to teaching or training except the elementary/secondary teaching group which comprises its own category. This includes: higher education/post-secondary training; kindergarten/pre-school training; non-teaching fields (school librarian, education administration, education psychology, guidance and counselling, *etc.*); physical education; and kinesiology, human kinetics, kinanthropology and recreation.

Fine Arts & Humanities

History; philosophy and religious/theological studies; classics and dead languages; all other languages, literature, linguistics; translation and interpretation; journalism and mass communications; library science and other records science.

Commerce

Commerce, management, business administration, administrative studies/science.

Economics

Straightforward.

Law

Law and jurisprudence. This first group (law) is dominated by those receiving professional degrees (normally leading to the bar) but also includes graduates in legal studies (*e.g.*, "pre-law"), which in many cases resembles the second group (jurisprudence). These groups are taken together principally because they cannot be differentiated in the earlier surveys.

Other Social Sciences

Anthropology, demography, and sociology; political science; psychology; social work and other social services; environmental studies (regional, urban, and city planning, community development, resource management, environmental studies); Canadian studies and other area studies (Slavic, mediaeval, Asian, *etc.*); criminology; specialised administration (*e.g.*, public administration, health administration, hotel and food administration, other specialised administration); secretarial studies; military studies; archaeology.

Agricultural & Biological Sciences

Agriculture, biology, biophysics, botany, fisheries/wildlife management, and household science and related.

Veterinary Sciences

Veterinary sciences (science, medicine, speciality) and zoology.

Engineering

All forms of engineering plus architecture.

Medical Professions

Medicine (Professional Program); dentistry (professional program).

Other Health

Nursing; paraclinical sciences (microbiology, immunology, pathology); epidemiology and public health; rehabilitation medicine (physiotherapy, occupational therapy, *etc.*); the basic medical sciences, including anatomy, biochemistry, biophysics, embryology, endocrinology, genetics, histology, neurophysiology, pharmacology, physiology, and other basic sciences.

Computer Sciences

Straightforward.

Mathematics and Other Physical Sciences

Math, physics (including astronomy and aerospace); chemistry; geology, metallurgy, and materials science; meteorology and oceanography.

Appendix B

Variables Used in the Analysis

This appendix explains the construction of the variables used in the analysis, including the degree to which the measures are comparable across survey years. It should be noted that some of these measures are different from similarly named ones directly available in the NGS databases, as described below in order to avoid confusion in this regard. The first part of this Appendix goes over each of the variables one at a time, while the second part goes into the construction of the various index various variables which have been created in a little more detail.

The Variables

The Overall Evaluation of the Education Program (Field) Index

Based on the question: "Given your experience…would you have taken the same field of study or specialization?", with the options being "Yes" or "No". The responses were then assigned scores of either 0 or 100, the higher value going to those who indicated they would choose the same field and zeros assigned where another field would have been chosen. The tables show the mean values of these scores, with higher values indicating greater "average" satisfaction with the chosen field of study, essentially representing the percentage of individuals who say they would have taken the program again.. See the last part of this Appendix for further discussion of the various index variables of this type used in the analysis.

These measures should be quite comparable across surveys, although differences in the structure of the related questions lend a small margin of uncertainty to this assumption. For the 1982 and 1986 cohorts, graduates were first asked a more general question: "Given your experience since completing the requirements for the diploma/degree…would you have selected the same educational program, a different program, or not taken any post-secondary program?" Those who answered "different" were, except in 1984, then asked the more specific field of study question (along with another question pertaining to the level of the program), while those who responded "same" to the more general question were assumed to have been content with their chosen fields (and were, therefore, assigned scores of 100). In 1992, two questions regarding field and level were asked in parallel (with no general question), while in 1995 *only* the field question was asked.

New Diplomas

Essentially all formal post-secondary degree/certificate/diploma programs were considered, with exceptions including the following: "interest"/recreation-type courses, which typically do not represent any sort of formal human capital investment and which should not generally have a direct effect on early labour market outcomes; banking and insurance certificates, which are normally gained largely as a matter of a course by those on certain career paths; non-professional health certificates which, by their very designation, are not generally career related; high school

diplomas, which were deemed to largely represent an accreditation formality without direct effects on labour market outcomes for those already possessing post-secondary diplomas; and registered apprenticeships, which were again seen to be part of a normal career path rather than additional formal schooling *per se*.

Labour Forces Status: Unemployment

The labour force status definitions generally follow standard Statistics Canada conventions. The one exception pertains to students: normally, part-time students looking for work are counted as being unemployed while full-time students are not, since they are deemed to not be "ready for work" due to their full-time student status; here, however, full-time students looking for work are counted as unemployed, presumably because enrolment status as of the interview dates is missing from most years of the NGS data (thus precluding the usual adjustment). The resulting unemployment rates are, therefore, slightly biased upwards relative to what would obtain with the more conventional procedures.

Part-Time Employment

Defined as a job at which the individual worked less than thirty hours per week – the standard definition.

Temporary Job

Based on a direct question to this effect: "Is this [the current (main) job] a temporary or permanent position?" (In 1984, the question was slightly different: "Did you have a permanent position?", but the results should be directly comparable).

There is, however, a slight problem with this variable in the 1987 data: individuals who had worked continually with the same employer since the first interview (1984) were not asked the question and were simply assumed to have been in a permanent job, whereas some individuals could have been in temporary jobs the whole time. As a result, the 1987 figures undercount the number of temporary jobs and are not directly comparable to those for the other years.

Self-Employment

Based on a direct question regarding the class of worker, with the response options being paid worker, self-employed, and "other" (including family workers, volunteer work, *etc.*), with workers of the latter type deleted from most of the analysis. Note that the self-employed comprise a relatively heterogeneous group, including individuals working under contract for others ("independent professionals"), those with their own companies ("entrepreneurs"), and so on.

The Job-Education Skill Match Index

Based on the question: "Do you use any of the skills acquired through the education program…in your job?" For the 1982 and 1986 cohorts, the response options were "yes" and "no"; for the 1990 cohort, the response options were "to a great extent", "to some extent", "very little", "not at all". These responses were then assigned scores between 0 and 100: for the 1982

and 1986 cohorts, scores of either 0 ("no") or 100 ("yes") were assigned, while the 1990 scores range from 0 ("not at all"), to 33 1/3 ("very little"), through 66 2/3 ("to some extent"), to 100 ("to a great extent"). The tables report the mean values of these scores, with higher scores representing closer job-education skill matches. See the last part of this Appendix for further discussion of the various index variables of this type used in the analysis.

Given the underlying response options, the scores should be generally comparable across interview years (two and five years after graduation) for a given cohort, and also comparable between the 1982 and 1986 cohorts, but not directly comparable between the first two cohorts and the last.

The measure used here departs from the derived variable available directly in the NGS databases, as the latter also depends on a question as to whether the individual's discipline was one which was intended to produce directly relevant job skills. The variable used here might, therefore, be thought of as being a "purer" measure of the actual job-education skill match which does not confound the effects of graduates' opinions of the intention of the program with the actual job-education skill relationship.

Educational Pre-Requisites of the Current Job

Based on the question: "When you were hired...what were the minimum educational qualifications required?" The over/under-qualified measures were then created by comparing the response with the level of the program completed in the graduation year – with the more detailed categories available post-1984 reduced to the broader "College", "Bachelor's", Master's", and Ph.D." categories available in that earlier year in order to focus on more significant differences and to have a consistent measure across all surveys.

This measure again differs from the one constructed by Statistics Canada directly available in the NGS. That measure was constructed by comparing the required level with either, in the case of the two-years surveys (1984, 1988, 1992) the highest level of education or, in the case of the five-year follow-ups (1987, 1991, 1995) the level of the program from which the individual graduated in the given year (the latter being used in the constructions described above). The resulting calculations would, therefore, be comparable across all three cohorts for a given interview year (two or five years after graduation), but not across interview years for a given cohort (*i.e.*, from two to five years following graduation) due to differences between the highest level of education and that which the individual obtained in the graduation year in question (including individuals who had returned to school to obtain a "lower" degree).

Job Satisfaction Index (Earnings, Overall)

Based on the questions: "Considering the duties and responsibilities of your job, how satisfied are you with the money you make?", and "Considering all aspects of your job, how satisfied are you with it?" The response options were similar in all years: "very satisfied", "satisfied", "dissatisfied", "very dissatisfied" in the 1986 and 1990 survey years (1988/91 and 1992/95); and the last two options differing very slightly for the first cohort: "not satisfied", "not at all satisfied". The responses were assigned values from 0 to 100 in the same manner as the job-education skill match variable, and the tables report the mean values of these scores, with higher

values indicating greater job satisfaction. See the last part of this Appendix for further discussion of the various index variables of this type used in the analysis.

Earnings

Based on the question: "Working your usual number of hours, approximately what would be your annual earnings before taxes and deductions at that job?" The variable thus represents what the person would earn on an annual basis were the job to last the full year, regardless of the actual job status. In adjusting for irregular work patterns in this manner, the measure represents the individual's rate of pay as measured on an annual basis, rather than the amount necessarily earned. It is a somewhat unconventional measure, but well-defined, analytically interesting, and presumably well reported (being a figure individuals either know, or should be able to calculate rather easily).

All earnings values are expressed in constant 1995 dollars, capped at the $99,000 upper limit which characterises the 1984 data (the lowest bound in the six databases), or $143,035 in constant 1995 dollars.

Further Notes on the Index Variables and the Related Standard Deviations

Each of the index variables mentioned above may be thought of as based upon more fundamental sets of evaluations regarding the overall evaluation of the educational program, the job-education skill match, or the level of job satisfaction. The data collection process and the construction of the indexes described above may thus be thought of as first reducing those more underlying evaluations to a series of discrete choices (the original response options contained in the NGS databases) and then transforming these categorical responses into the indexes whose mean scores are reported in the tables. Higher values thus indicate greater levels of satisfaction with the choice of field of study, closer job-education skill matches, or greater job satisfaction.

In short, the original responses given in the NGS data are transformed to a scalar measure which can be thought of as an index of the "average" level of the underlying evaluations. The constructed indexes have the distinct advantage of significantly reducing the dimensionality of the underlying evaluations and thereby facilitating much easier and more direct comparisons across groups and over time relative to what would be required working with the full set of categorical responses.

An analogy in the econometric literature is the general approach underlying the well-known dichotomous response models such as the probit, logit, and tobit. In these cases, there is assumed to be an unobservable underlying index variable which gives rise to the measured responses once certain thresholds are passed (*e.g.*, individuals enter the labour market when the market wage they face is greater than their (unobserved) reservation wage). In the present case, we may think of an underlying job-education skill match variable giving rise to the observed distribution of discrete responses included in the NGS databases. The conversion of these results to the 0-100 scales described above may, therefore, be seen as generating an index which represents the average levels of the more fundamental scores, with higher levels representing closer job-education skill matches or greater satisfaction.

The standard errors of the mean index scores which are reported are not exactly correct, since they assume normality, whereas the relevant index scores are distributed in a discrete fashion. They are, however, much easier to calculate, and should provide good approximations of the actual reliability of the measures. Most of the standard errors are (as reported) in fact quite small, suggesting that the majority of the observed differences are likely to be statistically significant.

In previous work (Finnie [1996]), the full sets of categorical responses were reported and complex-squared tests based on the underlying properties of the discrete distributions represented by the responses included in the NGS databases were used to test for differences across groups. The present approach has been developed since that time as a better means of summarising the relevant information.

Appendix C

Additional Tables

Table A1: Median Earnings (1995 Constant Dollars)

	1982 Cohort			1986 Cohort			1990 Cohort		
	1984	1987	Change	1988	1991	Change	1992	1995	Change
	$	$	%	$	$	%	$	$	%
All	**28,900**	**38,400**	**33**	**30,700**	**39,100**	**27**	**30,200**	**39,000**	**29**
Males									
All	**31,800**	**42,200**	**33**	**32,000**	**42,300**	**32**	**31,300**	**41,000**	**31**
No Specialization	21,700	-	-	30,700	38,100	24	29,200	40,000	37
Elem./Secon. Teaching	33,200	38,400	16	32,000	38,100	19	33,400	39,000	17
Other Education	28,900	35,800	24	29,500	36,000	22	26,100	34,000	30
Fine Arts & Humanities	23,100	38,400	66	25,800	32,800	27	20,800	31,000	49
Commerce	31,800	42,200	33	29,500	39,100	33	29,200	40,000	37
Economics	27,500	40,900	49	29,500	38,100	29	31,200	45,000	44
Law	27,500	44,800	63	33,200	57,100	72	31,300	48,000	53
Other Social Sciences	28,900	38,400	33	27,000	37,000	37	26,100	38,000	46
Agricultural & Bio. Sc.	27,500	38,400	40	27,000	40,200	49	26,100	35,000	34
Veterinary	-	-	-	33,200	-	-	-	-	-
Engineering	37,600	47,300	26	36,900	44,400	20	36,500	45,000	23
Medical Professions	50,600	115,100	127	43,000	52,900	23	36,500	85,000	133
Other Health	43,300	52,400	21	43,000	52,900	23	41,700	50,000	20
Computer Science	39,000	47,300	21	33,200	42,300	27	37,500	46,000	23
Math. & Other Phys. Sc.	36,100	47,300	31	34,400	46,500	35	32,300	44,000	36
Females									
All	**27,500**	**34,500**	**25**	**29,500**	**36,000**	**22**	**29,200**	**36,000**	**23**
No Specialization	26,000	-	-	25,800	33,800	31	20,800	33,000	59
Elem./Secon. Teaching	28,900	34,500	19	29,500	36,000	22	32,300	38,000	18
Other Education	27,500	35,800	30	24,600	31,700	29	24,000	31,800	33
Fine Arts & Humanities	21,700	32,000	47	22,100	32,800	48	24,000	32,000	33
Commerce	28,900	35,800	24	29,500	37,000	25	27,100	36,000	33
Economics	-	-	-	27,000	34,900	29	26,100	-	-
Law	28,900	42,000	45	32,000	40,200	26	35,400	51,000	44
Other Social Sciences	23,100	32,000	39	24,600	33,800	37	25,000	32,000	28
Agricultural & Bio. Sc.	26,000	35,800	38	24,600	32,800	33	26,100	35,000	34
Veterinary	-	-	-	34,400	-	-	31,300	-	-
Engineering	33,200	44,800	35	35,600	42,300	19	36,500	42,000	15
Medical Professions	43,300	70,300	62	36,900	63,500	72	35,400	53,000	50
Other Health	34,700	38,400	11	35,600	39,100	10	36,500	40,000	10
Computer Science	36,100	46,000	27	30,700	42,300	38	35,400	43,000	21
Math. & Other Phys. Sc.	34,700	46,000	33	32,000	39,100	22	29,200	37,000	27

Appendix C (Cont.)

Table A2: Mean Earnings, Full-Time Workers (1995 Constant Dollars)

	1982 Cohort			1986 Cohort			1990 Cohort		
	1984 $	1987 $	Change %	1988 $	1991 $	Change %	1992 $	1995 $	1995 %
All	**33,200**	**42,100**	**27**	**33,200**	**41,400**	**25**	**33,400**	**40,400**	**21**
Males									
All	**36,300**	**46,900**	**29**	**35,900**	**44,700**	**25**	**34,700**	**43,400**	**25**
No Specialization	-	-	-	33,900	45,300 [a]	34	32,700 [a]	38,300 [a]	17
Elem./Secon. Teaching	34,800	39,500	14	34,500	38,400	11	34,400	38,400	12
Other Education	28,000	34,400	23	31,700	38,700	22	29,800	35,900	20
Fine Arts & Humanities	27,300	37,200	36	30,100	35,900	19	25,700	33,200	29
Commerce	35,000	45,500	30	34,600	44,400	28	33,700	43,400	29
Economics	33,500 [a]	45,400 [a]	36	31,900	40,000	25	32,500	44,800 [a]	38
Law	38,500 [a]	56,300 [a]	46	36,800	58,900 [a]	60	39,000	52,500 [a]	35
Other Social Sciences	32,200	41,600 [a]	29	32,600	36,600	12	29,500	37,300	26
Agricultural & Bio. Sc.	33,000 [a]	42,600 [a]	29	29,100	39,800	37	29,500 [a]	35,900 [a]	22
Veterinary	-	-	-	-	-	-	-	-	-
Engineering	38,500	46,500	21	37,100	45,500	23	38,400	46,100	20
Medical Professions	68,600 [b]	99,800 [b]	45	67,500 [b]	84,800 [b]	26	57,400 [b]	88,400 [b]	54
Other Health	53,100 [b]	70,200 [b]	32	49,300 [b]	57,100 [b]	16	47,800 [a]	51,100 [a]	7
Computer Science	39,900	48,100	21	34,600	43,600	26	37,800	46,300	22
Math. & Other Phys. Sc.	36,500	46,400	27	35,700	44,700	25	36,700	44,900 [a]	22
Females									
All	**29,500**	**36,600**	**24**	**30,200**	**37,700**	**25**	**32,100**	**37,500**	**17**
No Specialization	-	-	-	27,600	34,900	26	25,900	34,700 [a]	34
Elem./Secon. Teaching	28,600	33,700	18	30,000	35,500	18	33,100	37,800	14
Other Education	27,500	33,300	21	27,400	34,000	24	26,500	31,000	17
Fine Arts & Humanities	24,900	32,300	30	25,500	31,200	22	28,400	32,500	14
Commerce	29,400	38,100	30	30,700	39,800	30	30,800	37,500	22
Economics	-	-	-	29,900 [a]	35,500	19	-	-	-
Law	32,400	49,000 [a]	51	34,900	48,500 [a]	39	40,300 [a]	57,800 [b]	43
Other Social Sciences	26,600	32,100	21	26,900	34,500	28	28,900	33,900	17
Agricultural & Bio. Sc.	29,300	34,600	18	26,400	33,000	25	28,900	33,100	15
Veterinary	-	-	-	-	-	-	-	-	-
Engineering	35,900	42,300 [a]	18	36,400	43,100	18	39,200 [a]	43,000	10
Medical Professions	46,400 [b]	80,400 [c]	73	47,100 [b]	70,500 [b]	50	59,600 [b]	74,100 [b]	24
Other Health	36,700	41,000	12	35,900	41,000	14	39,000	42,200	8
Computer Science	39,100 [a]	45,600 [a]	17	31,900	42,200	32	35,800 [a]	41,800 [a]	17
Math. & Other Phys. Sc.	34,200 [a]	41,800 [a]	22	33,500	41,000	22	32,500 [a]	39,600 [a]	22

Note: The means with no letter subscript have standard errors below 500, those with an *a* have standard errors between 500 and 1000, and those with a *b* have standard errors between 1000 and 2000.

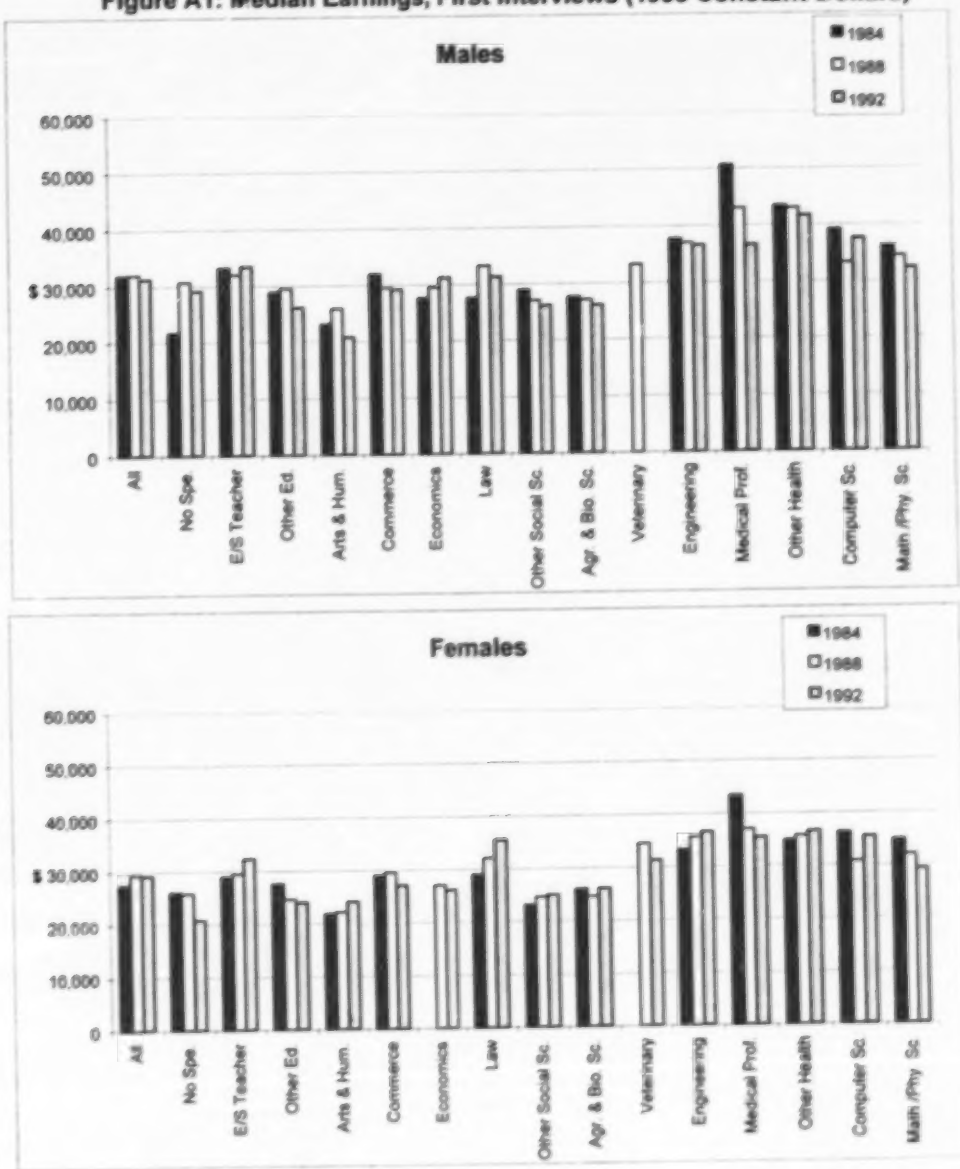
Appendix C (Cont.)

Table A3: Median Earnings, Full-Time Workers (1995 Constant Dollars)

	1982 Cohort			1986 Cohort			1990 Cohort		
	1984	1987	Change	1988	1991	Change	1992	1995	Change
	$	$	%	$	$	%	$	$	%
All	**30,300**	**40,900**	**35**	**30,700**	**41,300**	**35**	**31,300**	**40,000**	**28**
Males									
All	**33,200**	**43,500**	**31**	**32,000**	**42,300**	**32**	**31,300**	**42,000**	**34**
No Specialization	-	-	-	32,000	40,200	26	31,300	41,000	31
Elem./Secon. Teaching	34,700	39,600	14	32,000	39,100	22	33,400	40,000	20
Other Education	28,900	37,100	28	29,500	37,000	25	27,100	35,000	29
Fine Arts & Humanities	26,000	40,900	57	29,500	33,800	15	20,800	34,000	63
Commerce	31,800	44,800	41	30,700	39,100	27	29,200	40,000	37
Economics	28,900	40,900	42	30,700	39,100	27	31,300	45,000	44
Law	31,800	44,800	41	36,900	57,100	55	35,400	50,000	41
Other Social Sciences	30,300	40,900	35	29,500	37,000	25	29,200	39,000	34
Agricultural & Bio. Sc.	28,900	39,600	37	29,500	40,200	36	27,100	38,000	40
Veterinary	-	-	-	-	-	-	-	-	-
Engineering	39,000	47,300	21	36,900	44,400	20	36,500	45,000	23
Medical Professions	57,800	115,100	99	43,000	52,900	23	36,500	100,000	174
Other Health	43,300	53,700	24	43,000	52,900	23	41,700	50,000	20
Computer Science	39,000	47,300	21	34,400	42,300	23	37,500	46,000	23
Math. & Other Phys. Sc.	36,100	47,300	31	34,400	46,500	35	34,400	44,000	28
Females									
All	**28,900**	**37,100**	**28**	**29,500**	**39,100**	**33**	**30,200**	**39,000**	**29**
No Specialization	-	-	-	25,800	37,000	43	20,800	35,000	68
Elem./Secon. Teaching	30,300	38,400	27	30,700	38,100	24	32,300	40,000	24
Other Education	27,500	38,400	40	27,000	34,900	29	27,100	34,000	25
Fine Arts & Humanities	23,100	37,100	61	22,100	37,000	67	26,100	35,000	34
Commerce	27,500	38,400	40	29,500	39,100	33	28,100	37,000	32
Economics	-	-	-	25,800	37,000	43	-	-	-
Law	34,700	43,500	25	32,000	44,400	39	36,500	52,000	42
Other Social Sciences	26,000	34,500	33	25,800	37,000	43	27,100	37,000	37
Agricultural & Bio. Sc.	28,900	37,100	28	25,800	33,800	31	27,100	35,000	29
Veterinary	-	-	-	-	-	-	-	-	-
Engineering	34,700	44,800	29	36,900	45,500	23	36,500	43,000	18
Medical Professions	40,500	89,500	121	36,900	63,500	72	35,400	65,000	84
Other Health	36,100	40,900	13	36,900	42,300	15	36,500	42,000	15
Computer Science	36,100	46,000	27	30,700	42,300	38	35,400	43,000	21
Math. & Other Phys. Sc.	36,100	46,000	27	32,000	42,300	32	30,200	37,500	24

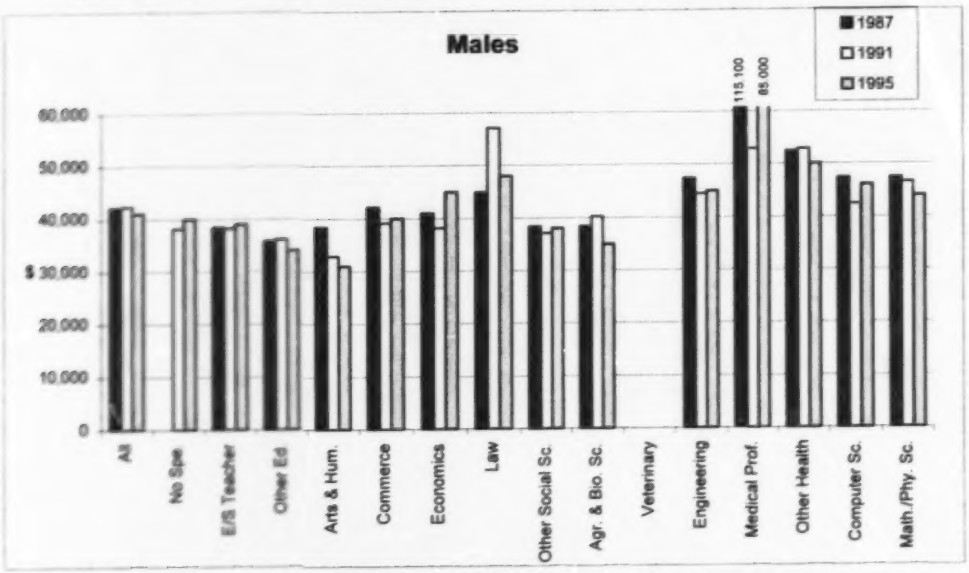
Appendix C (Cont.)

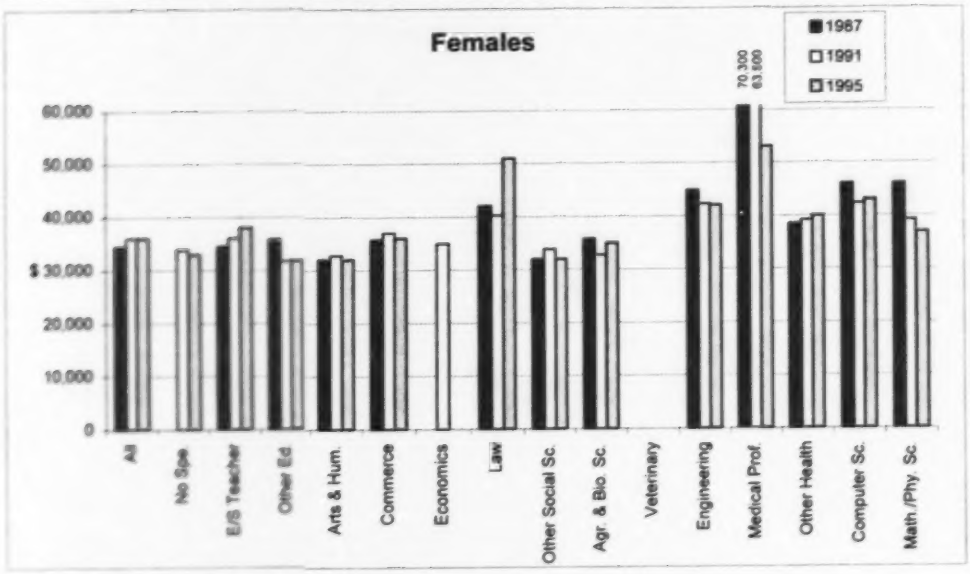
Figure A1: Median Earnings, First Interviews (1995 Constant Dollars)



Appendix C (Cont.)

Figure A2: Median Earnings, Second Interviews (1995 Constant Dollars)





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